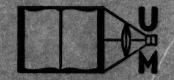
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ABSTRACTS OF DISSERTATIONS AND MONOGRAPHS IN MICROFORM

UNIVERSITY MICROFILMS, INC. ANN ARBOR, MICHIGAN: 1959



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AGRICULTURE

AGRICULTURE, GENERAL

PRODUCTION ALTERNATIVES IN RESPONSE TO PRICE CHANGES FOR A 320 ACRE WHEAT-BEEF FARM IN SOUTH CENTRAL KANSAS

(L. C. Card No. Mic 58-7392)

Charles Frederick Bortfeld, Ph.D. University of Minnesota, 1958

This study is concerned with maintaining the equilibrium of a representative 320 acre wheat-beef farm in south central Kansas when changes occur in wheat-cattle price relationships. The objectives of the study were:

- A. To set up alternative farm organizations for a representative 320 acre wheat-beef farm in south central Kansas, and
- B. To determine the changes in wheat-beef prices which justify a shift to a different farm organization.

Budgeting was used throughout the study. A representative 320 acre wheat-beef farm was developed for south central Kansas. Four alternative farm organizations (Plans A, B, C & D) were also developed. In comparison to the representative farm, plan A provided for more beef and less wheat, plan B for beef production only, plan C for more wheat and less beef, and plan D for wheat production only.

A comparison was made of the family labor earnings of all five farm organizations. The earnings of the representative farm were the greatest so it was assumed it was more nearly in equilibrium. Various changes in wheat-beef prices were suggested and a comparison was made of the earnings of the representative farm with plan A, plan A with plan B, the representative farm with plan C, and plan C with plan D. As soon as the earnings of one organization were greater than another, the organization with the greater earnings appeared to be more nearly in equilibrium and hence should merit adoption.

The following were the recommended changes in farm organizations as a result of the indicated changes in wheat-beef prices:

A change from the representative farm to Plan A when: Wheat prices fall more than 9 percent.

Wheat prices fall more than 15.5 percent and cattle prices decline less than 5 percent.

All cattle prices increase more than 6.7 percent. Slaughter steer prices increase by more than 5.5 percent, stocker and feeder steer prices increase by not more than 2.75 percent.

Wheat prices decrease more than 3.8 percent, all cattle prices increase more than 3.8 percent.

A change from Plan A to Plan B when:
Wheat prices decrease more than 27.5 percent.
Wheat prices decrease more than 30.5 percent,
stocker and feeder steer prices decline by 5

percent or more, slaughter heifer and slaughter steer prices decline by less than 5 percent. All cattle prices increase by more than 37.5 percent. Wheat prices increase less than 2 percent, stocker and feeder steer prices increase less than 40 percent, slaughter steer and slaughter heifer prices increase by more than 40 percent.

A change from the representative farm to Plan C when: Wheat prices increase more than 16 percent. Stocker-feeder and butcher steer prices decline less than 19 percent, slaughter steer prices decrease more than 19 percent.

Stocker-feeder and butcher steer prices increase more than 35 percent.

Wheat prices fall less than 5 percent, slaughter steer prices decline more than 25 percent, and stocker-feeder steer prices and butcher steer prices decline less than 25 percent.

Wheat prices increase more than 14.5 percent, slaughter steer prices decrease more than 15 percent, stocker-feeder steer prices and butcher steer prices decrease less than 15 percent.

A change from Plan C to Plan D when:
Wheat prices increase by at least 104 percent.
Stocker-feeder steer prices and butcher steer
prices decrease more than 40 percent.
Wheat prices increase more than 52 percent and
all cattle prices decrease more than 20 percent.
Microfilm \$2.00; Xerox \$6.60. 138 pages.

MARKETING FLORIDA ASPARAGUS PLUMOSUS FERNS

(L. C. Card No. Mic 58-3484)

Tze I. Chiang, Ph.D. The University of Florida, 1958

Problem

Asparagus plumosus Ferns are one of several greeneries used in combination with flowers in making floral arrangements. About 95 percent of the United States' supply of plumosus ferns is produced in Florida. Practically no data or information pertaining to marketing ferns are available.

Procedure

A preliminary questionnaire and auxiliary schedules were drawn up and pretested. A list of growers in the four major fern producing counties--Volusia, Lake, Putnam and Seminole--was compiled. Growers were stratified into three groups--large growers with 20 acres or more,

medium-sized from 10 to 19.99 acres and small from 0.5 to 9.99 acres. A sample was drawn by selecting all large growers, 50 percent of the medium-sized operators and 10 percent of the small growers. Interviews were also made with a judgment sample of growers in Marion, Palm Beach, Brevard, Duval, St. Lucie and Hillsborough Counties. Of 79 growers interviewed, 50 provided satisfactory information and 29 gave partial or unsatisfactory data.

Data were collected on the quantity and value of ferns sold by various market outlets, acreage, etc. Additional information was acquired on the demand and supply situation, market distribution, costs and returns and existing major problems of the industry. Marketing data related to the period from July, 1955, through June, 1956.

Sales invoice data were obtained from a subsample of seven growers. Shipping information was obtained from the Railway Express Agency office at Pierson, Florida.

Results

Prices of plumosus ferns have declined in recent years. The quantity of ferns shipped to market has also declined. The high degree of substitution possible between the various greeneries and plumosus weakens the position of the latter in the market.

In 1955-56 the acreage devoted to the production of plumosus ferns was 2,072.5 acres. The volume marketed was estimated at 382,704,000 sprays for which growers were paid \$3,525,000. Nearly one-third were sold through wholesale commission florists. More than 40 percent were marketed to wholesale florists on an f.o.b. basis. Retail florists purchased one-fourth of the total on an f.o.b. basis. Nearly 3 percent were sold to local fern growers. Average returns to growers per 1,000 sprays varied for different outlets--f.o.b. retail \$10.27, wholesale consignments \$9.04, f.o.b. wholesale \$8.90 and sales to local growers \$5.29.

An analysis of the market distribution of plumosus ferns in August, 1956, showed that about 45 percent of the total went to the Southeast, 16 percent to the Midwest, 4 percent to the Southwest and Far West and nearly 3 percent to Canada.

Medium-sized growers had the highest average returns after all harvesting and marketing charges were paid. They also had the lowest average marketing costs among the different grower groups.

Conclusion

The declining prices and volume of plumosus ferns shipped to market may be attributed to a large degree to disorderly marketing. This is characterized by extreme price fluctuations, variations in seasonal supply, lack of market information, lack of grade standardization, competition between growers, misunderstandings with wholesale commission florists, etc. The regulation of supplies, adoption of grading practices, improving market information services and encouragement of promotion and research are considered as possible means for strengthening the economic position of the Florida plumosus fern industry. These measures are not mutually exclusive in nature. They might be carried out by one or more of the following alternative organizations -- marketing agreements, trade associations, cooperatives, a state fern commission and custom packing and handling firms.

Microfilm \$2.50; Xerox \$8.80. 192 pages.

GROWTH SUBSTANCES IN THE FLOWER AND
DEVELOPING FRUITLET OF THE APPLE DURING
THE IMMEDIATE POST-BLOSSOM PERIOD:
AN INVESTIGATION INTO THE CAUSAL MECHANISM
OF FRUIT SET IN THE APPLE

(L. C. Card No. Mic 59-437)

Arthur David Crowe, Ph.D. Cornell University, 1958

As part of the larger problem of commercial control of fruit set, investigation of growth substances in the developing and non-developing apple was made. Methanol was used to extract the active substances. Separation of the various compounds was made by paper partition chromatography using a two-solvent system. This is a modification of existing techniques and has been given the name of "L-chromatography". Activity was determined by Avena straight-growth tests.

Three major growth substances were found in the apple flower at anthesis and during the period of initiation of fruit growth. These are believed to be identical to Luckwill's Malus auxins #2 and #3 and Malus inhibitor #2.

In the initiative stages, extractable auxin was not measurably different from pollinated and non-pollinated fruitlets. The content of inhibitor #2 was slightly higher in the non-pollinated fruitlets but this is interpreted as being the result rather than the cause of degeneration of these non-developing flowers.

An examination of the amounts of these three growth substances extracted from a wide spectrum of varieties also failed to demonstrate clear-cut differences which could be associated with the setting behavior of these varieties.

Diffusates from the pedicels of developing fruitlets were, however, much more active than were those from non-developing fruitlets. The major portion of the activity of these diffusates was shown chromatographically to be due to Malus auxin #2.

The results are interpreted as indicating that the growth substances measured in the present study are not causal of fruit development; and that measurements of auxin content may bear little relationship to the role of auxin in the tissue under study since auxin content at a specific moment in time can only measure the balance between rate of synthesis and rate of utilization.

Implications of these findings to the larger problem of elucidation of the mechanics of fruit set are discussed. It is theorized that there is produced, after syngamy, by the fertilized ovule a factor (X) which controls fruit development.

Microfilm \$2.50; Xerox \$8.80. 192 pages.

EXPERIMENTAL STUDY OF ESTRUS AND OVULATION IN SWINE

(L. C. Card No. Mic 58-7575)

Billy Neil Day, Ph.D. Iowa State College, 1958

Supervisor: R. M. Melampy

Results are presented from a study designed to make observations on the control of estrus and ovulation in swine

with exogenous hormones. Studies were also made on the relative concentration of the gonadotrophic hormones in swine pituitaries and on the induction of estrus in ovariectomized gilts. Observations were made on a total of 105 gilts.

Induced ovulations were observed in gilts injected with a purified follicle stimulating hormone preparation. In some cases estradiol benzoate was administered by intramuscular injection one day after the FSH injection. The supplemental estrogen induced estrus in only 1 of 12 gilts treated during the luteal phase of estrous cycle.

A group of 14 gilts was given a single intramuscular injection of FSH to determine the time interval from the day of treatment to the subsequent estrus produced by endogenous hormones. Six of the gilts showed estrus 18 to 21 days after the FSH injection. Ninety percent of the ova recovered from these gilts were fertilized. The remaining gilts in this group showed no response or an extended estrous cycle.

The pituitary bioassays were conducted on hypophysectomized female rats, intact male rats and pigeons. Although the bioassays employed do not offer a direct quantitative measurement of the follicle stimulating or luteinizing hormone concentration in the anterior pituitary, the uterine weight response was considered to give an approximate relative FSH potency. Similarly, the male accessory sex glands were used to obtain an estimate of the relative LH potency.

The anterior pituitaries were collected from gilts slaughtered during estrus, diestrum, early proestrum and at 25 and 85 days of pregnancy. The FSH potency was lowest during estrus and approximately the same at diestrum and early proestrum. Pituitaries representing the 25th day of gestation were found to have a lower FSH potency than those collected during early proestrum or at the 85th day of pregnancy. The mean weights of the ventral prostate and seminal vesicles of the assay animals indicate the LH potency of the anterior pituitary was higher in pregnant gilts than in gilts slaughtered during estrus or early proestrum. The lactogenic hormone concentration, as determined by crop gland proliferation in pigeons, was higher in pituitaries obtained from pregnant gilts than those representing non-pregnant gilts.

Estrus was induced in ovariectomized gilts administered 0.2 mg. of estradiol benzoate per hundred pounds of body weight. High levels of progesterone exerted an antagonistic effect on sexual receptivity in ovariectomized gilts when given in combination with estradiol benzoate.

Microfilm \$2.00; Xerox \$4.40. 85 pages.

THE INFLUENCE OF CLAY TYPE ON ORGANIC MATTER RETENTION, AND ON URONIC AND AMINO ACID FORMATION DURING THE DECOMPOSITION OF ORGANIC MATERIALS

(L. C. Card No. Mic 58-7971)

Paul Harrison Everett, Ph.D. Purdue University, 1958

Major Professor: Herbert W. Reuszer

The investigations reported here were conducted to study the influence of clay type and nature of crop residues

on the fundamental nature and amount of organic matter resulting from the decomposition of plant materials.

An experiment was set up in which mixtures of clay, sand and organic materials were inoculated with a soil suspension and incubated under conditions conducive to microbial decomposition. The inorganic portion of the mixtures was made up of twenty per cent clay and eighty per cent quartz sand. Organic materials were added in amounts equivalent to 5 per cent of the weight of clay present. For comparative purposes, controls containing sand and organic materials only, were also included.

Bentonite and kaolinite were chosen as clay types due to wide differences in their exchange-capacity and adsorption characteristics. The organic materials included alfalfa and wheat straw representing whole plant materials; one high in protein, the other low. Individual plant components were also included to study their role in organic matter formation. They were cellulose, pectin to represent polyuronides, glucose as a simple water-soluble substance, and casein representing protein. Where needed NH₄ NO₃ was used to adjust the C:N ratio to that of the alfalfa.

The course of decomposition was followed through carbon dioxide evolution determinations made at frequent intervals during the incubation period. These determinations indicated no uniform effect of clay on the organic matter retention from the various organic substances. The retention from alfalfa, pectin, and glucose was increased by bentonite and to a lesser extent by kaolinite. After 318 days incubation 10% more of the carbon in alfalfa remained in the bentonite-sand mixture than in the control. The value for glucose was 8% and for pectin 4%. Kaolinite gave a 6% greater retention of alfalfa and pectin, 4% of glucose, and 1% of wheat straw. Organic matter retention from cellulose and casein was decreased by the two clays.

pH determinations made on the mixtures in the preceding experiment indicated that variations in this factor might account for some of the inconsistencies observed. A similar experiment was conducted in which pH values were kept reasonably similar in all treatments by the addition of 0.5% calcium carbonate. Urea was used to adjust the C:N ratios and the clays and organic materials were the same as in the previous experiment.

Quite consistent results were obtained in this experiment. The retention of organic matter was found to follow the order bentonite-sand > kaolinite-sand > sand alone (controls) for every organic substance except cellulose where the order was reversed and wheat straw where the control gave a slightly greater retention than kaolinite. The presence of clays thus increased the retention of organic matter except cellulose, or, conversely, retarded the breakdown of these substances in the decomposition mixtures.

Using modifications of a colorimetric method adapted to soils by Lynch et al. (43) the uronic acid content of the residual mixtures was determined.

The uronic acid content was greater in the presence of bentonite for all the organic materials used. However, with casein the increase was rather slight when compared to the other substances. This also held true for glucose in the absence of CaCO₃. The differences in uronic acid content between the kaolinite treatment and the control were probably insignificant.

Lower uronic acid contents were found when CaCO₃ was present in the decomposition mixtures. This may

have been due to the shorter incubation period in the experiment in which CaCO₃ was added to the mixtures.

Acid hydrolysates of the residual mixtures resulting from the decomposition of alfalfa, pectin and glucose in the presence of bentonite, kaolinite, and sand alone were analyzed for basic and nonbasic amino nitrogen present. The method of analysis was ion-exchange chromatography on Dowex-50 exchange resin with identification of the individual amino acids being confirmed using paper chromatography.

Lysine and histidine were the only two basic amino acids occurring in the mixtures in detectable quantities, with histidine being present in only the bentonite-sand-glucose mixture. Ammonia was present in all of the mixtures but in amounts somewhat smaller than lysine.

In the absence of clays basic amino acids did not occur, or occurred in very small amounts in the residual mixtures. In the presence of clays considerable amounts of basic amino nitrogen appeared; the amounts being almost twice as great with bentonite as with kaolinite. This was true even in the mixtures receiving organic substances of a non-protein nature i.e., glucose and pectin.

Microfilm \$2.00; Xerox \$7.20. 152 pages.

ECONOMIC ASPECTS OF GRAIN STORAGE IN NORTH CENTRAL UNITED STATES

(L. C. Card No. Mic 58-7555)

Kenneth Royden Farrell, Ph.D. Iowa State College, 1958

Supervisor: Richard Phillips

Storage and transportation are necessary to satisfy consumer demand for grain with respect to time and place. This joint production activity of commercial grain marketing firms was referred to as the transfer activity. Firms compete interregionally in such activities. Such competition is facilitated by and coordinated through an extensive system of grain markets. Under conditions of a perfect market in time and place, the transfer activity would be conducted with the least possible outlay of economic resources in the system as a whole. The basic objective of this study was to determine the least cost location of commercial grain storage stocks in ten North Central states in 1954.

The determinants of the storage stock location problem were (1) regional grain storage capacity and costs, (2) regional grain supply, (3) regional grain requirements and (4) interregional transportation costs during 1954. Twentythree regions including ten states and five terminal grain markets of the North Central United States were delimited for study. Grain storage capacity of country elevator, terminal elevator and wholesale grain processing plants in each of the 15 North Central regions was determined. Only variable storage costs were relevant because regional storage capacity was regarded as fixed. It was found that average variable and marginal transfer costs could be regarded as constant in a given plant. The level of plant costs was dependent upon storage capacity and differed between grains depending upon length of storage of grain. Regional grain supply consisted of the January 1, 1954 car-

ryover and grain received from farmers at plants in the North Central area; supply of grain in other regions was fixed at zero. Grain requirements in the 15 North Central regions consisted of the net requirements of each region; requirements in the other regions consisted of the volume of grain shipped to those regions from plants of the North Central area. Rail freight rates between each net surplus and deficit region were determined.

The least cost shipping-storage program for each of six types of grain was determined by means of the transportation model procedure. From these programs the least cost location of storage stocks between types of plants within and between regions was determined and compared to the actual location and plant utilization patterns of 1954.

Major conclusions of the analysis were:

1. Storage facilities of terminal elevators, particularly those in major markets, would be generally utilized to a higher degree in the least cost location arrangement than other types of facilities.

2. Considering regional trends in the production of grain, the need for expansion in commercial storage facilities appeared to be greatest in the central corn belt states.

Microfilm \$2.90; Xerox \$10.00. 222 pages.

BIOLOGY AND CONTROL OF HOUSEFLY LARVAE

(L. C. Card No. Mic 59-720)

Garrit John Lugthart, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor Robert J. Dicke

Although many new chemicals have been developed in recent years, the housefly, <u>Musca domestica</u> Linn., is still a major pest on many Wisconsin dairy farms. It is evident that insecticides used against the adults do not maintain adequate fly control. Increased emphasis should be placed on removal of breeding media. However, sanitation is not always possible because of lack of time or inaccessibility of breeding sites. Therefore, larviciding or a mechanical means of control would be desirable to assist in reducing the number of flies.

Laboratory studies.--Tests of various chemicals were undertaken to evaluate their larvicidal effects. The testing method was designed to be representative of field conditions. Diazinon, American Cyanamid 4124, Chlorthion, and malathion were found to be effective in relatively small amounts.

The possibility was investigated that exposure to sublethal concentrations of toxicants might cause indirect effects upon the adults resulting from surviving larvae, such as variations in weight or sex ratio. In general, the data showed that low dosages of compounds which are effective larvicides do not cause the weights of the treated and untreated flies to vary greatly. Significant weight differences occur on exposure to larger dosages. The proportion of males to females did not appear to be altered. Apparently sex does not influence resistance or susceptibility of larvae.

Erratic results were obtained from the treatment of field and laboratory media containing pupae. Thus, the effect of larvicides on pupae of various ages was studied. It was found that as age increases, resistance to larvicides increases.

Since it was observed that greater larval control occurred in moist to wet media a study was made to determine the influence of the media moisture content on larval kill. Larvicidal treatment of media with various moisture contents showed that as moisture content increased, larval kill increased.

Field studies.--Several of the compounds showing promise in the laboratory trials were tested rather extensively. The toxicants were applied by sprinkling can to various breeding sites, such as manure accumulated in young stock pens or storage piles, pea vines, tankage, and areas adjacent to feed bunkers. Diazinon was superior to the other chemicals tested. However, the results of these trials were extremely variable and unpredictable. The tests revealed that the following factors should be considered to obtain effective control with larvicides: the amount of litter present; the amount of moisture present; whether the media surface is porous or compact; the type of breeding site.

Since manure disposal often becomes a problem, a means of controlling maggots in stored manure was sought. Tests were conducted to find if covering stacked manure with polyethylene film would eliminate immature forms present and prevent further egg deposition. Fly activity was completely suppressed by covering stacked manure with a plastic tarpaulin and treating the edges of the pile with a larvicide.

To learn more about larval environment, studies were made to determine the temperature, pH, and moisture content of both laboratory and field breeding media. In regard to these factors three day old larvae-infested media was found to be similar to field media.

Microfilm \$2.00; Xerox \$5.80. 120 pages.

GAS SORPTION BY SOILS AND CLAY MINERALS

(L. C. Card No. Mic 58-7563)

Francis Shigeru Nakayama, Ph.D. Iowa State College, 1958

Supervisor: A. D. Scott

Moist soil and clay mineral samples were progressively dried to different moisture levels and the amount of O_2 and CO_2 sorbed (adsorbed and absorbed) was determined. The experimentally determined sorption values were compared with solubility values predicted by Henry's law. Water vapor pressure measurements were also made and related to the sorption data.

Except for bentonite and one of the Edina subsoil samples, the amount of O_2 sorbed by the materials containing more than 10 to 15% moisture was comparable to the theoretical solubility of O_2 in water. Bentonite and the one Edina subsoil sample sorbed less than the theoretical amount of O_2 . These low sorption values may have been due to salting-out effects or the inaccessibility of interlayer water for the solution of O_2 . The CO_2 sorption values were generally greater than the theoretical sorption values for the materials at high moisture levels.

When the soils and clay minerals were dried to mois-

ture levels below 10 to 15%, the gas sorption values increased rapidly. The O₂ sorption values obtained with two subsoil samples in this moisture range were compared with O₂ solubility values calculated from an expression that was derived to take into account deviations from Henry's law due to capillary and salting-out effects. From this comparison it was concluded that the initial decrease in water vapor pressure and the associated initial increase in gas sorption observed when the moisture level was decreased was due to capillary effects. When the soils and clay minerals were dried further, there was a large increase in sorption due to the process of adsorption. No salting-out effects were observed with these soil samples.

The amount of gas adsorbed by oven-dried soils and clay minerals was determined and related to the clay and organic matter content of the materials. The adsorptive capacity of the 110° C. oven-dried soils was linearly related to their clay content, but bentonite and kaolinite did not fit the relationship. There was no relationship between the adsorptive capacity of the dry materials and their organic matter content.

Oven-dried soils adsorbed more O_2 than bentonite on an equivalent clay basis. When the samples were heated to higher temperatures there was a decrease in the adsorptive capacity of the soils, but not the bentonite. Illite behaved like the soils. Destruction of the organic matter by H_2O_2 did not affect the adsorptive capacity of illite or the Edina subsoil samples. When bentonite was treated with gelatin, the adsorptive capacity of the oven-dried material was increased.

It is suggested that soils adsorb more O₂ and CO₂ than bentonite in an oven-dry state because organic molecules between the lattice layers prevent the complete contraction of the lattice of the soil clays. As a result, the internal surface of the expanding type clay minerals remains accessible for gas adsorption in the soils, but not in the bentonite.

Microfilm \$2.00; Xerox \$7.20. 152 pages.

MOVEMENT OF WATER IN UNSATURATED SOILS AS RELATED TO SOIL PHYSICAL PROPERTIES

(L. C. Card No. Mic 58-7564)

Donald Rodney Nielsen, Ph.D. Iowa State College, 1958

Supervisor: Don Kirkham

The rapid redistribution of soil water immediately following infiltration was studied in four Iowa soils. The observed redistribution of water within these soils was explained on the basis of soil physical properties.

Field plots were twice thoroughly wet and allowed to drain for at least 2 weeks. Initial soil moisture contents were then determined at 6-inch intervals throughout the profile to 5-foot depth. Six inches of additional water was then applied to each plot at the soil surface. The hydraulic head never exceeded 1/2 inch. After infiltration had ceased, soil water content was frequently measured throughout the profile. Measurements of water were discontinued after the soils had drained to their initial soil moisture contents. All measurements of soil water in the field were made with a neutron scattering moisture meter.

Soil core samples were removed from all depths of each plot where soil moisture was measured. Moisture release curves, capillary conductivities and particle size distributions were determined in the laboratory on the core samples. To measure the capillary conductivities new techniques were developed.

To determine the moisture release curves (soil moisture content versus soil moisture suction) of individual soil samples specially constructed lucite pressure units were used. The moisture release data obtained with the units were combined with soil depth measurements to form a three dimensional graph. The graph was useful in explaining the water redistribution in the field and should also be helpful to workers in soil classification and soil genesis.

The field moisture measurements indicated the presence of restricting layers. These layers were experimentally verified by the laboratory capillary conductivity measurements, except for a glacial till soil. For the till soil the laboratory measurements failed to account for vertical sand lenses found in the field.

On all four soils, at the instant following the penetration of the last of the added 6 inches of surface water, an increase of moisture content was noticed throughout the profile, even at 5-foot depth. This increase is in agreement with the mathematical theory of infiltration. That the increased water content at great depths has previously not been noticed, even though it here could be definitely measured by the neutron meter, proves the accuracy of the meter in field moisture investigations.

Microfilm \$2.15; Xerox \$7.60. 162 pages.

RELATIVE EFFICIENCIES OF SIZE FRACTIONS OF DOLOMITIC LIMESTONE

(L. C. Card No. Mic 59-721)

Thomas John Nimlos, Ph.D. The University of Wisconsin, 1959

Supervisor: R. B. Corey

An accurate knowledge of the quality of ground limestone is of prime importance since most of the lime added to soils is in this form. The quality of ground limestone is generally determined by the neutralizing value and the fineness of grind or particle size. Although the ultimate neutralizing ability of the limestone is easily determined, its reactivity is not. Many workers have attempted to evaluate the various grades of limestone by determining the reactivities of the component size fractions, but the results obtained by these workers have not always agreed.

The objectives of this study were to determine the relative efficiencies of the size fractions of dolomitic limestone by greenhouse and field investigations and to develop a chemical method to make the same determination with a laboratory procedure.

The greenhouse study consisted of a pot experiment where two acid soils were treated with various size fractions of dolomitic limestone and cropped with alfalfa. The two soils, Almena silt loam, a Planosolic-Weak Podzol, and Waupun silt loam, a Brunizem, were chosen to provide soils with different kinds and amounts of organic matter. The crops were harvested and the soil pH determined peri-

odically throughout the experiment. The experiment was designed to provide both crop yield and increase in soil pH as criteria for rating the fractions. Crop yield proved an unsatisfactory criterion since there were no highly significant yield differences, but increase in soil pH proved very satisfactory. The fractions were rated on the basis of their ability to raise the soil pH to the same level, with the 100-mesh fraction assigned a relative efficiency of 100 and the percent effectiveness of the other fractions calculated accordingly. While the efficiencies varied slightly between the two soils, they were approximately 80 for the 60-80-mesh fraction, 30 for the 20-40-mesh fraction, and 25 for the 8-20-mesh fraction.

The field study was similar to the greenhouse study in that a soil, Oak Grove silt loam, the moderately-well drained member of the Waupun catena, was treated with various size fractions of dolomitic limestone and the pH determined periodically. The efficiencies were calculated in the same manner as in the greenhouse experiment and were 75 for the 60-80-mesh fraction and 25 for the 20-40-mesh fraction.

The soil pH data indicate that the Waupun silt loam had a larger lime requirement than Almena silt loam, which could not be attributed to exchangeable hydrogen since both soils contained approximately the same amounts. However, it is assumed that the larger lime requirement of the Waupun, a prairie soil, can be attributed to the organic matter.

The laboratory studies were initiated to develop a chemical method for evaluating the reactivity of limestone size fractions by routine analysis. To accomplish this the reactivities of the size fractions was first determined. The methods studied were designed to dissolve a volume of limestone from each fraction equivalent to that which was shown to react in greenhouse and field experiments. However, the reagents reacted with the internal surface area as well as the external surface area so an acceptable procedure was not developed. An alternate procedure, designed to precipitate a layer on the surface of the particle, also failed since the fine particles caked even with continuous agitation.

These data are of prime importance in regard to the legal requirements of Grade A limestone, established in Wisconsin Statute 94.665, involving the fineness of grind. Since the 60-80-mesh material is almost equally as effective as the 100-mesh material the legal criterium based on the 60 mesh sieve is superior to that based on the 100 mesh sieve. Microfilm \$2.00; Xerox \$4.80. 94 pages.

THE CHEMOTHERAPY OF OAK WILT

(L. C. Card No. Mic 59-723)

William Robert Phelps, Ph.D. The University of Wisconsin, 1959

Supervisors: Associate Professor James E. Kuntz and Professor A. J. Riker

The effect of selected antibiotics and chemicals on the oak wilt pathogen in culture and in inoculated oaks and factors which influence their activity were studied.

Several antibiotics and chemicals prevented conidial

germination and mycelial growth of <u>C. fagacearum</u> on agar culture. Of these, at 10 ppm certain antibiotics (especially phytoactin, oligomycin, actidione and several of its derivatives) and certain chemicals at 10 ppm (especially phenyl mercuric compounds, Vancide 51, Dithane 14, crystal violet, malachite green, 8-hydroxy quinoline benzoate and sodium azide) were active.

In agar culture conidia were more resistant than mycelium to the chemotherapeutants. At concentrations of 0.1 to 1 ppm of oligomycin, actidione, and phytoactin, germ tube formation occurred, but the tubes failed to produce mycelium and secondary conidia. At low concentrations (0.01 ppm), there occurred a stimulation of conidial germination and the formation of secondary conidia.

In trunk injected oaks, antibiotics (especially oligomycin, phytoactin, and actidione) and chemicals (especially 2-mercaptobenzothiazole, benzoic acid, indole 3-acetic acid, and sodium azide) prolonged the incubation period of the disease from 3 weeks to 12 months after inoculation. Actidione and oligomycin were translocated from the point of trunk injection throughout the tree. Actidione was absorbed and moved further from the point of application in much greater amounts and in a shorter period of time than oligomycin. Oligomycin and actidione were detected in oak trees up to 3 and 4 weeks, respectively, after trunk injection.

Other methods of application were tested. Soil drenches in a single trial were effective in prolonging the incubation period of the disease for at least 12 months after inoculation. When actidione and oligomycin were applied as soil drenches they were absorbed by the oak roots. Actidione was absorbed in much greater amounts than was oligomycin. Leaf sprays were relatively ineffective in prolonging the incubation period of the disease. Actidione and oligomycin also were absorbed by the oak leaves, but in smaller amounts than was absorbed by the roots.

Chemotherapeutic treatments gave best results in preventing wilt if inoculations were made in a lateral branch or near the place of treatment, if inoculations were made at the time of or just after treatments, if the number of conidia per tree was less than 100,000 spores, or if adequate soil drenches were employed.

Single treatments of high concentration as well as treatments made each spring for several seasons reduced the percentage of trees showing oak wilt symptoms. Treatments also prevented or reduced fungus mat formation.

Treatment of healthy trees within root grafting distance of diseased trees reduced greatly the percentage of disease spread into healthy trees when treatments were made for 2 years each spring in May or early June.

Microfilm \$2.00; Xerox \$5.20. 101 pages.

AVAILABILITY OF NONEXCHANGEABLE POTASSIUM AND AMMONIUM TO PLANTS AND MICROORGANISMS

(L. C. Card No. Mic 58-7582)

Louis Frederick Welch, Ph.D. Iowa State College, 1958

Supervisor: A. D. Scott

The objectives of this study were to determine the effect of K on the release and availability of fixed NH₄ in

soils and clay minerals to nitrifying bacteria, and to determine the effect of added NH₄ and/or K on the release and availability of nonexchangeable soil K to plants.

An active nitrifying culture containing less than 0.5 ppm. K was established and used as inoculum to determine the nitrification of fixed NH₄ in soils and clay minerals. It was established that this level of K did not limit the nitrification process per se. Different levels of added K were therefore used and the effect of K on the release and availability of fixed NH₄ to nitrifying bacteria was determined.

With three NH₄-saturated vermiculites that contained about 95% of the total NH₄ in the fixed form, essentially all the NH₄ was nitrified in the absence of added K, but at high levels of K only slightly more than the exchangeable NH₄ was nitrified. Apparently, the added K blocked the release of NH₄ from its fixed position. The magnitude of this effect was related to the fixable/replacing cation ratio in the nutrient solution. As the ratio increased the release and subsequent nitrification of fixed NH₄ decreased. Similar results were obtained with partially-NH₄-saturated vermiculite, but it was found that added K blocked the release of fixed NH₄ more effectively when there was only a small amount of fixed NH₄ in the vermiculite.

All of the NH₄ in bentonite and illite was not nitrified even though no K was added. Added K, however, inhibited nitrification just as it did in vermiculite. Preliminary studies were conducted with soils, but no definite conclusions could be drawn because of the small quantity of fixed NH₄.

A short-time greenhouse cropping technique was utilized to determine the effect of added NH₄ and/or K on the release and availability of nonexchangeable soil K to plants. The technique was particularly suitable in that the plants absorbed large quantities of K if available, NH₄ did not affect the absorption of soluble K, and nitrification of added NH₄ was limited by the time factor.

NH₄ or K added singly decreased the release of nonexchangeable soil K, and the effect was additive when the cations were added together.

Microfilm \$2.25; Xerox \$7.80. 169 pages.

AGRICULTURE, ANIMAL CULTURE

MUSCLE DEVELOPMENT IN TWO GENETIC GROUPS OF SWINE AS INFLUENCED BY THE AMOUNT OF FEED AND LENGTH OF FEEDING

(L. C. Card No. Mic 58-7574)

Rodney Jean Cooper, Ph.D. Iowa State College, 1958

Supervisor: L. N. Hazel

The purpose of this study was to observe the effects of two levels of feeding (full feeding and 85 per cent of a full feed) on the carcass composition of pigs that were slaughtered at the same weight and pigs that were slaughtered at the same age after they had been fed on pasture and on concrete during the finishing period. Two genetic groups which differed considerably with respect to leanness (Yorkshires and Duroc x Landrace x Poland Crossbreds)

were used to see if they responded in the same way or differently under these comparisons.

When full fed and limited fed pigs were slaughtered at the same weight, the former were younger and fatter. The limited fed pigs had a lower dressing percentage and a higher percent lean cuts than the full fed pigs. The value of the market hogs on a live weight basis was slightly increased by limited feeding because the increase in the weights of the more valuable cuts was sufficient to offset the decrease in dressing percentage.

When limited fed pigs and full fed pigs were slaughtered at the same age, the weight of the lean cuts was 4 per cent heavier (7 per cent for the Crossbreds and 1 per cent for the Yorkshires) for the full fed pigs. The difference between the two levels of feeding was smaller for those measures which more nearly reflected only differences in lean. This suggested that the rate of growth for lean was affected very little by the restriction of the feed intake to 85 per cent of a full feed during the finishing period.

The carcasses of the pigs fed on pasture and those of the pigs fed on concrete were similar for most comparisons. The Yorkshires were considerably leaner than the Crossbreds. For most measures of leanness the difference between the two genetic groups was about twice as large as the difference between the full fed and limited fed pigs which were slaughtered at the same weight.

The most pronounced genetic group x treatment interaction was observed for carcass length. Interactions involving genetic groups were significant for several other traits, too. However, most of these interactions were larger than they should have been because the limited fed Crossbreds were restricted more than the limited fed Yorkshires and consequently the full fed Crossbreds at the older age were heavier than the full fed Yorkshires at the older age. The interactions involving genetic groups accounted for a relatively small portion of the variation in most of the traits within the range of genotypes and environments used.

Information was also obtained concerning the value of certain indicators of carcass merit. Those studied included the center of gravity of the carcass, probes taken when the pigs weighed 140 lbs., and probes taken to the false lean compared to probes taken through the false lean at the site of the shoulder probes.

Microfilm \$2.05; Xerox \$7.40. 156 pages.

SOME STUDIES OF SWINE DYSENTERY

(L. C. Card No. Mic 58-7969)

John William Davis, Ph.D. Purdue University, 1958

Major Professor: Russell K. Jones

An enteric disease syndrome known as swine dysentery was investigated. The effect of some of the nitrofurans and sodium arsanilate on this disease was studied. Studies were also made concerning the etiology of the disease, characterization of the suspected etiological agent, immunological response and some hematological studies.

Seven attempts were made to reproduce swine dysentery by exposure of susceptible pigs to vibrios and in one

instance to a mixed bacterial suspension. The disease was produced only once in one of 15 experimental pigs.

Vibrios were experimentally established in the intestinal tract of pigs.

Vibrios were recovered from two of 72 fecal samples collected from healthy swine. None were demonstrated in the mucosal surfaces of 28 colons taken from commercially slaughtered swine.

Twenty-three vibrio cultures were characterized by some selected biochemical tests. All of the vibrios studies were catalase positive, H₂S positive, indol negative, produced nitrites from nitrates, grew only in a pH range of 5.8 to 8.2, did not affect litmus milk, did not grow at 16° C. and 45° C. but did at 29° C. and 37° C., did not liquefy gelatin during seven days and did not ferment carbohydrates and other related compounds during 48 hours with the exception of the following: Four Vibrio fetus cultures isolated from the blood stream of humans failed to produce H₂S, and one Vibrio ovis culture isolated from the stomach fluid of an aborted lamb was H₂S negative. One vibrio isolated from a pig sick with swine dysentery grew in the pH range of 5.2 to 8.9.

A serological test which detected antibodies in rabbit hyperimmune sera produced against a heat treated vibrio antigen failed to detect agglutinins in sera of pigs that had been observed with clinical swine dysentery for 19 consecutive days. Agglutinins for the experimental vibrio antigen were not detected in any of 100 swine sera representing 22 herds.

A Selas 03 filtrate of a dysentery infected colon failed to produce dysentery when given orally to a susceptible pig. A Berkefeld N colon filtrate failed to produce dysentery when injected directly into the lumen of the colon of a susceptible pig.

A supernate obtained by differential centrifugation if diseased colon produced a febrile reaction and diarrhea when part of it was given orally, along with vibrios, to a pig and part of it was injected into the lumen of the large colon of a susceptible pig.

Feces of pigs exposed to swine dysentery were not infectious for other pigs until clinical signs of dysentery occurred in the pigs from which the feces were collected.

In naturally infected herds, four therapeutic field trials of furazolidone alone or in comparison with arsenicals were conducted. In three of the trials furazolidone gave evidence of therapeutic and prophylactic effect. In one trial it failed to do so. In one simulated field trial comparing nf-256, furazolidone and sodium arsanilate, the group on nf-256 made slightly better gains, but the group on sodium arsanilate recovered in a shorter period of time from swine dysentery. A trial with three water soluble products was conducted, namely NFZ soluble, nf-256 and sodium arsanilate. When NFZ soluble was given at the rate of 10 grams for each gallon of drinking water for nine days, symptoms of swine dysentery were not alleviated; nf-256 when given for a period of 10 consecutive days at the two gram level for each gallon of drinking water did not stop diarrhea in pigs, although the feces did become free of blood and mucus. Administration of sodium arsanilate at 0.449 grams for each gallon of drinking water alleviated the symptoms of swine dysentery after the fourth day of treatment. Clinical swine dysentery developed between 10 and 15 days after initial contact when furazolidone, at the rate of 2.2 pounds per ton of total feed, was fed daily to pigs which were in constant contact with others

sick with swine dysentery except for a daily period of one hour when they were removed so that medicated feed could be given them.

There were no specific blood alterations demonstrated in pigs affected with swine dysentery.

Microfilm \$2.00; Xerox \$5.40. 109 pages.

EFFECT OF THYROACTIVE COMPOUNDS ON LACTATING SOWS

(L. C. Card No. Mic 58-7576)

Conwell Winston Johnson, Ph.D. Iowa State College, 1958

Supervisor: Damon V. Catron

These investigations were conducted between May, 1956 and June, 1958; they were divided into 17 experiments and include data from 505 sows and their litters. Twelve of these experiments were conducted with thyroprotein using a total of 390 sows and litters; 356 of these sows and litters were involved in experiments where half of the sows were fed on the optimum level of thyroprotein tested, 100 mg. per lb. ration, from farrowing to weaning. Five experiments, which included 115 sows and litters, were conducted where Na tetraiodo-L-thyronine (thyroxine) and Na triiodo-L-thyronine (T-3) were investigated. The following points summarize these investigations:

1. Of the levels of thyroprotein tested, 0, 50, 100, and 200 mg. per lb. of ration, the 100 mg. level produced an increased gain of pigs weaned at 1 week of age of 0.56 lb. or 27 percent. This difference in gain was statistically significant P < .01. The above level of thyroprotein did not appreciably affect the sows' heart rate, rectal temperature, respiration rate or feed consumption; furthermore, there were no statistical differences due to treatment between the milk-fat, milk solids non-fat or total milk solids. The 50 and 200 mg. level had no appreciable effect on first week pig gain; the higher level increased the sow rectal temperature and respiration rate. There were no observed adverse side reactions noted on the nursing pigs in any of the levels of thyroprotein tested.

2. Pigs nursing sows fed thyroprotein and weaned at 2, 3, or 5 weeks of age also gained more than their controls. The pigs weaned at 2 weeks of age gained statistically more than their controls P < .05. Those weaned at 3 weeks of age also gained statistically more than their controls P < .15. The pigs weaned at 5 weeks of age gained 1.8 lb. more than their controls; this difference was not statistically significant.

3. The increase in pig gain observed above was accompanied by a decrease in pig mortality of an average of 0.37 pig per litter.

4. The use of thyroprotein for the first 3 days following farrowing resulted in a depression in first week pig gain. The withdrawal of thyroprotein on the seventh day postpartum produced a depression in second week pig gain.

5. When sows were fed a relatively high energy ration, well fortified with protein, vitamins, minerals, and sources of unidentified growth factors -- those fed the thyroprotein supplemented ration lost approximately 6 lb. more during the period from 110 day gestation to 3 days postpartum and

12 lb. more during the nursing period. The sows on the control ration lost 12 lb. more during the first 4 days post weaning.

6. Thyroxine fed to lactating sows at the rate of 1 mg. per lb. of ration did not improve first week pig gains.

7. T-3 fed to lactating sows, at the rate of 500, 600, and 800 mcg. per lb. of ration, increased metabolic activity. At the rate of 300, 400, or 500 mcg. per lb. of ration it did not appreciably affect the first 2 week pig gains.

8. T-3 fed to lactating sows, at the rate of 200, 300, or 400 mcg. per lb. of ration depressed 5 week pig gains.

9. Air conditioning during the hot summer months did not appreciably affect 2 week pig gain or sow performance.

10. No observed adverse effects were noted from full-feeding the sow a highly fortified ration from farrowing to weaning.

11. The correlation between sow 14 day milk alkaline phosphatase and 2 week pig gain was -0.38.

Microfilm \$2.05; Xerox \$7.40. 156 pages.

A GENEALOGICAL STUDY OF THE ROMNELET SHEEP

(L. C. Card No. Mic 58-7405)

Hobart Frank Peters, Ph.D. University of Minnesota, 1958

The Romnelet breed of sheep was developed at the Canada Range Experimental Farm, Manyberries, Alberta, from a cross of 15 purebred Romney Marsh rams on 520 grade Rambouillet ewes, with infusions of Targhee and Romeldale after the second generation of inter-mating. A study of the performance records of Romnelets born from 1938 to 1955 was made to determine the genetic trends in birth weight, weaning weight, post-weaning gain and yearling clean fleece weight, and the amount of selection practised for these traits.

All animals were classified by generation as follows: offspring of Romney/Rambouillet mating = F1, offspring of F1/F2 mating = F2.5, etc. Genetic trends in performance were estimated by intra-year regression of performance on generation or, where there was evidence of heterogeneity of regression, by intra-year analysis of variance comparisons of the mean performance of generations.

There was a significant decline in birth weight and weaning weight of lambs, 18-month weight of ewes and clean fleece weight from the F1 to the F2 generation. Birth weight, weaning weight and clean fleece weight also declined from F2 to F3, although the decline for weaning weight was not statistically significant. After the F3 generation there was a slight, further decline in birth weight, but no significant change in post-weaning traits occurred. Weaning weight increased after the fourth generation and the upward trend from F5 to F7 was statistically significant.

The computed selection differentials were 0.28 pound for birth weight, 5.44 pounds for weaning weight, 1.82 pounds for post-weaning gain to one year of age, and 0.26 pound for clean fleece weight. Estimation of mean percentages of potential maximum selection differential applied for performance showed that greatest emphasis in selection was placed on weaning weight. However, the

selection differential for weaning weight was only 46.5 per cent of that attainable if percentage of replacements needed had been the only limiting factor.

The mean generation score of the 1955 lambs was F6.18 and the estimated mean inbreeding coefficient was 7.68 per cent.

Microfilm \$2.00; Xerox \$4.60. 90 pages.

SOME EFFECTS OF PHYSICAL FORMS OF RATIONS ON FEED UTILIZATION BY LAMBS

(L. C. Card No. Mic 58-7451)

Granville Berry Thompson, Ph.D. University of Missouri, 1958

Supervisor: Professor W. H. Pfander

This manuscript reports results of experiments designed to determine the effects of various methods of ration preparation on feed utilization by lambs and to determine the associated changes in animal physiology with particular reference to the gastrointestinal tract.

Three fattening trials were conducted involving 82 lambs divided into 10 lots and self-fed for 68-78 days. Methods of ration preparation used included: ground, pelleted, and whole grain, each fed with long, chopped, and pelleted roughages; and also complete rations in meal, pellet, and ground pellet forms. Stomach measurements and rumen samples were taken at slaughter. Rumen contents were analyzed for dry matter and total steam-volatile fatty acids. The per cent of the individual acids in the total volatile fatty acid content was determined by gas-liquid chromatography. Slices of rumen tissue were taken for histological studies.

- The results of these experiments indicated that feeding lambs completely pelleted rations compared to the same ration unpelleted resulted in: increased feed efficiency, and total steam-volatile fatty acids produced during rumen fermentation.

Pelleting either the concentrate or the roughage portion, or grinding the completely pelleted form, of a ration containing equal parts of alfalfa and corn did not significantly improve lamb responses over conventional forms of the same ration and were inferior in lamb responses to the completely pelleted form.

Feeding lambs completely pelleted rations containing 50 per cent coarse mature alfalfa and 50 per cent concentrates compared to the same ration with the roughage portion fed as chopped hay increased the per cent of glycogenic acids and slightly decreased the per cent ketogenic acids in the total volatile fatty acids produced during rumen fermentation, thereby possibly reducing the heat increment of feeding.

The improvement in lamb responses due to pelleting complete rations was greater when 50 per cent of the ration consisted of low quality roughage than with high quality roughages.

Feeding lambs completely pelleted rations compared to conventional forms resulted in changes to the rumen mucous membranes characterized by enlarged rumen papillae with increased accumulation of vesiculated keratinized cells of the papillary corneum, enlarged central core, and increased folding of the Malpighian layer.

The rate of absorption of a mixture of acetic, propionic, and butyric acids from the reticulo-rumen of two lambs previously fed completely pelleted rations was significantly greater than from two lambs previously fed the same ration as chopped hay-shelled corn.

The physiological significance of the alteration of the rumen membranes and the alteration of the end products of rumen fermentation requires further investigation.

Microfilm \$2.00; Xerox \$5.60. 115 pages.

AGRICULTURE, FORESTRY AND WILDLIFE

INTERRELATIONSHIP OF BRUSH POPULATIONS AND SOME SITE FACTORS IN JACK PINE STANDS OF NORTH CENTRAL MINNESOTA

(L. C. Card No. Mic 58-7393)

Bruce Antone Brown, Ph.D. University of Minnesota, 1958

Adviser: Dr. Henry L. Hansen

The jack pine forests of Minnesota constitute a resource which is of great value in its economy. In 1957 it was reported that 177,613 cords of jack pine were cut on State, Federal and County lands.

There is evidence to indicate that the regeneration of these forests is far from adequate. The recent forest survey reported a total of 1,425,400 acres of grass-upland brush type in the 16 northeastern counties where forestry is the life-blood of many communities. This unhealthy forest condition demands research directed toward the basic factors involved. This investigation was undertaken to ascertain what stand conditions and site factors are related to the development of brush populations in natural undisturbed jack pine stands.

Field data were collected in 1953, 1954, 1955, and 1956 from 101 sets of plots so that stand basal area, stand age, site index, brush density, brush age, silt plus clay content of the 3 to 6 inch layer of the soil, and average stand diameter could be determined.

Regression analyses of the linear relationships of these data indicated that for the variables tested and within the range of the variables, unstratified by site quality or stand composition, that the standard error of the regression coefficient is the smallest for the regression of the logarithm of brush density on the silt plus clay content of the 3 to 6 inch layer of the soil. The analyses of these gross relationships showed that the logarithm of brush density was a highly significant and linear function of the stand basal area, average stand diameter, and site index. There was also a highly significant curvilinear relationship between the logarithm of brush density and stand age, brush age, and number of brush species per plot. These relationships all indicate that the number of stems of brush per acre is a function of the productive capacity of the area. The precise relationships are somewhat obscure because of many factors: interaction of dependent variables, coaction, compensating factors, and the limited size of the sample. Although this study was not designed so that correlation

analyses could be used, it is felt that the trends herein indicated lay the groundwork for more widespread investigation.

In the interpretation of these data one must keep in mind the fact that this study was restricted to natural, undisturbed jack pine stands. Also that the analyses only indicate the basic relationship between the variables of the sample and do not estimate population parameters.

Microfilm \$2.00; Xerox \$6.00. 123 pages.

AGRICULTURE, PLANT CULTURE

PRODUCTIVITY AND CHEMICAL COMPOSITION
OF LADINO CLOVER (TRIFOLIUM REPENS L.)
GROWN ALONE AND IN MIXTURE WITH GRASSES
AS INFLUENCED BY HEIGHT AND FREQUENCY
OF CUTTING AND FERTILIZER LEVELS

(L. C. Card No. Mic 59-709)

Paul Gervais, Ph.D.
The University of Wisconsin, 1959

Supervisor: Professor Dale Smith

The studies were conducted at the Experimental Farm, Lennoxville, Quebec, Canada, on Coaticook silt loam. In Experiment I, Ladino clover grown alone and in mixture with timothy and smooth bromegrass was cut 2, 4 and 6 times per season to a height of $1\frac{1}{2}$ and 3 inches. In Experiment II, phosphorus and potassium were applied separately at 5 levels - 0, 60, 120, 180, 240 pounds per acre - and in all combinations prior to seeding a Ladino clover-timothy mixture. Plots were cut 4 times per season to 3 inches.

Experiment I - Forage yields were collected during 1955 and 1956 from a seeding made in 1954. Ladino clover grown alone yielded more clover than when associated with a grass. The 2 mixtures did not differ in clover yields. Timothy outyielded bromegrass in 1955 only. Mixtures produced more total forage than Ladino clover alone.

Cutting to $1\frac{1}{2}$ inches gave higher fraction and total yields during both years than cutting to 3 inches, except in the grass fraction in 1956. The mixtures yielded more clover but much less grass and total production when cut 4 times than when cut twice. The lowest yields occurred with 6 cuttings. With Ladino clover alone, increased frequency of cutting depressed yields. The mixed swards contained the most clover when cut 4 times to $1\frac{1}{2}$ inches and the least when cut twice to 3 inches.

The clover fraction contained more protein and Ca, and less fibre, fat and K than the grasses. Bromegrass contained more protein, ash, P and K, and less N-free extract than timothy.

Height of cutting failed to modify the chemical composition of the grasses. In the clover, close cutting reduced the fat and K contents and increased the ash content.

The protein content increased and the fibre and N-free extract decreased in both forage fractions with increasing cutting frequencies. Fat was highest in the clover cut 4 times and in the grasses cut 4 and 6 times. Ash content in the clover was not affected greatly by cutting frequency but

was highest in the grasses cut 4 and 6 times. Calcium content was lowest in the clover cut 6 times and in the grasses cut twice. In both forage fractions, the P and K contents were higher with 4 or 6 cuttings than with 2 cuttings.

Experiment II - Forage yields were collected during 1954, 1955 and 1956 from a seeding made in 1953. Ladino clover yields were influenced by K fertilization but not with P. Timothy yields increased linearly with increasing soil P levels in 1954 and 1955. Clover yields increased with increasing soil K levels up to 120 pounds per acre in 1954 and up to 180 pounds in 1955. In 1956, the increase was a linear function. Potassium fertilization depressed the timothy yields in 1954 but had no effect in 1955 and 1956.

The percentage of clover in the harvested forage tended to increase with increasing soil K levels and to decrease with increasing soil P levels. The reverse was true for timothy. Ladino clover contained more protein and Ca, and less fibre, fat, and K than timothy.

The fibre, N-free extract and ash contents of the clover decreased linearly, while the P content increased linearly with increasing soil P levels. Protein and Ca contents increased linearly while the K content decreased linearly with increasing soil P levels but with some leveling off at the higher levels. Fat remained unchanged.

Potassium fertilization caused linear decreases in the protein, Ca and P contents, and linear increases in the fibre and ash contents in the clover. Potassium uptake increased with the K supply. The N-free extract and fat contents underwent no changes.

The Ca and P contents in timothy increased linearly and the K content decreased linearly with increasing soil P levels. No trend was established in the other constituents.

Potassium fertilization caused linear increases in the fibre, ash and K contents in timothy, and linear decreases in the N-free extract, Ca and P contents. The protein and fat contents were not modified.

Microfilm \$2.35; Xerox \$8.20. 179 pages.

AGRONOMIC AND ECONOMIC EVALUATION OF DIRECT AND RESIDUAL CROP RESPONSES TO VARIOUS FERTILIZER NUTRIENTS

(L. C. Card No. Mic 58-7568)

Joseph Andrew Stritzel, Ph.D. Iowa State College, 1958

Supervisors: John Pesek and Earl O. Heady

A twice-replicated, randomized-block, 5 x 4 x 3 NPK factorial experiment was initiated on corn in 1953 on a calcareous-variant Webster silty clay loam and continued over a 4 year period to study residual nutrient effects on oats and hay from both agronomic and economic viewpoints. Topdressings of N and P were made to measure residual effects of single nutrient applications. Agronomic evaluation was made on the basis of crop yield, nutrient percentage and nutrient yields, while economic evaluation was made for corn yield and for a cumulative 4 year yield.

A procedure for determining the best fitting equation to characterize yield data was investigated. The procedure

involves selection of significant variables by analysis of variance, subdividing significant treatment variable sum of squares into its linear, quadratic, etc., components and testing them for significance, and accepting or rejecting significant components on the basis of agronomic logic.

Significant yield responses were obtained for N, P and NP combinations on corn with predicted optimum rates for the best fitting equation being 93.9 pounds of N and 69.6 pounds of P_2O_5 . These nutrient rates resulted in an optimum yield of 114.5 bushels and a profit of \$36.25 per acre.

Significant residual N and P effects were observed on crop yields throughout the 3 year residual period. Residual N increased oat yields but decreased subsequent hay yields. Residual P increased both oat and hay yields. Sigmoid type yield curves characterized both residual N and P effects.

Percent N and P equations for corn grain and oat dry matter generally showed dilution effects which resulted in decreasing nutrient percentages as dry matter or grain yields increased. The greatest dilution effect usually occurred when a response was obtained to one limiting element in the absence of another. When both limiting nutrients were added together in combinations leading to optimum yields, the dilution effects were reduced in varying degrees depending on the crop. On the hay crops, however, P and K percentages followed the crop yield trends without dilution effects.

Nutrient yield equations followed the trends of the crop yield equations rather consistently in all cases.

Returns over the 4 year period for "once in the rotation" fertilization were over \$100 per acre or over \$25 per acre per year on the average. Even if these results are discounted for time, risk and uncertainty, they are large enough to merit further consideration in more detailed experiments along this line.

Microfilm \$3.35; Xerox \$11.40. 259 pages.

THE INFLUENCE OF NIGHT TEMPERATURE ON THE DEVELOPMENT OF THE FRUIT OF THE SOUR CHERRY (PRUNUS CERASUS L., VAR. MONTMORENCY)

(L. C. Card No. Mic 58-779)

Loren Davenport Tukey, Ph.D. The Ohio State University, 1952

Introduction

The growth of drupaceous fruits, such as the apricot, peach, and cherry, occurs in three distinct stages arbitrarily designated as Stages I, II, and III.^{1,2,3} The length of these periods varies with the different species as well as with varieties of the same species.^{2,3,4} Also, for a variety, the number of days from full bloom to fruit maturity differs from one season to the next and for a single season from one growing region to another.⁵ Factors such as embryo abortion and warm night temperatures have been shown to influence the duration of these stages. For example, peach fruits with embryos mechanically destroyed during Stage II (induced embryo abortion) had a shorter duration of this stage and subsequently a fewer number of days from full bloom to maturity than untreated peaches.⁶ Apricot

fruits subjected to night temperatures approximately 20° F. above the prevailing night temperatures during their development had a shorter duration of Stage I and a longer duration of Stage II. There was no apparent effect on the duration of Stage III.⁷

The purpose of the dissertation was to evaluate the effect of night temperature on the growth of the fruit of the sour cherry, Prunus cerasus L., var. Montmorency.

Procedure

The night temperature experiments were conducted during the seasons of 1948 and 1949 on four-year-old Montmorency cherry trees. The trees were growing in the orchard of the Department of Horticulture and Forestry at The Ohio State University, Columbus, Ohio.

Different night temperatures were maintained in specially constructed heated chambers in which were placed segments of bearing sour cherry trees. Temperature treatments were conducted each night between 7 p.m. in the evening and 7 to 8 a.m. in the morning, beginning at the time of full bloom and extending to fruit maturity. Average night temperatures were maintained in 1948 at approximately 10° and 20° F. above the prevailing night temperature and in 1949, approximately 20° and 25° F. The night temperature conditions were recorded on a thermograph.

Six different night temperature conditions were compared in the study. They were designated as follows: check temperature treatment in 1948, CK₁; check temperature treatment in 1949, CK₂; medium temperature treatment (10°) in 1948, M; high temperature treatment (20°) in 1948, H₁; high temperature treatment (20°) in 1949, H₂; very high temperature treatment (25°) in 1949, VH.

Within each treatment, ten marked cherry fruits and regularly collected samples were used for studying fruit development as affected by the various night temperatures. External growth measurements were made every 2 or 3 days from the marked cherries. The samples collected every 3 or 4 days and at critical periods in development were used for internal as well as for additional external measurements. The external measurements were made of suture diameter, cheek diameter (right angles to suture), and length to calculate the average diameter of the fruit. Internal measurements were made of the length of the embryo. From these measurements growth curves for the developing fruit were constructed and the results from each treatment then compared.

In addition to average night temperature, differences in night temperature were expressed in terms of "heat units" in order to determine if the duration of a stage or stages was correlated to a definite number of "heat units" based upon night temperatures. A "heat unit," as used in this study, is defined as one degree Fahrenheit per hour above a base temperature of 40° F.

Refractive index of the juice of the fleshy pericarp was determined with an Abbé refractometer at the completion of the treatments in the 1949 season. These readings were expressed as per cent sucrose. Observed differences in leaf color intensity were recorded in 1949 at the completion of the treatments with a "Photovolt" photoelectric meter, susing 50 leaves removed at random for each sample.

Results and Discussion

The results from this study show that the general pattern of Montmorency sour cherry fruit development was similar to that described by Tukey³ irrespective of the night temperature conditions. Further, the size of the fruits at the completion of each stage was similar with the exception of the cherries subjected to the highest average night temperatures during Stage III (VH, 91.2° F.). Here, the cherries were slightly smaller in average diameter. However, the duration of each stage was markedly affected by the six different night temperatures. Also, night temperatures influenced the quality of the fruit at maturity.

The duration of each stage is shown graphically in Figure 1. Here, as the average night temperature increased from the CK₁ treatment to the VH treatment, the duration of Stages I and II decreased while that of Stage III increased. The shortest duration of Stages I, II, and III, 12, 11, and 16 days respectively, was found at an average night temperature of 79.5°, 87.8° and 62.0° F. respectively. This was in contrast to the conditions producing the longest duration of these stages at 21, 19, and 31 days respectively, and average night temperatures of 54.5°, 53.7° and 91.2° F. Under natural growing conditions the shortening influence of warm night temperatures during Stages I and II might partially or completely offset the lengthening effect of high night temperatures during Stage III (Figure 1).

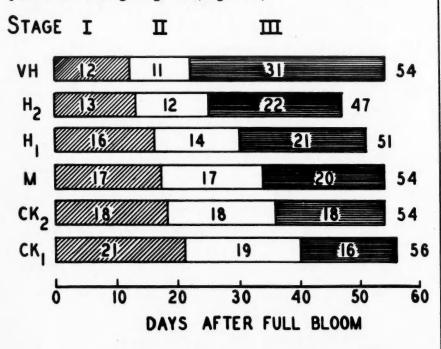


Figure 1. A graph showing the duration of each stage of the fruit development of the Montmorency sour cherry at the respective temperatures: CK_1 - Check 1948, CK_2 - Check 1949, M - Medium 1948, H_1 - High 1948, H_2 - High 1949, VH - Very High 1949.

Night temperatures were found to influence the duration of the fruit growing season more during Stage I than during Stage III which appears to verify the reports by others^{9,10} that warm temperatures immediately following full bloom are most effective in decreasing the length of the period for full bloom to fruit maturity.

Noticeable effects of night temperature on fruit quality were evident at the completion of Stage III. The highest night temperatures (VH - 1949) produced poorly colored fruit (yellow to pink with a red blush) as well as fruits with low percentage of sugar. The per cent sucrose was lowest (9.71 per cent) at the highest night temperature, intermediate (11.01 per cent) at the intermediate temperature, and highest (13.41 per cent) at the lowest temperature. This would appear to stress the importance of relatively cool

night temperatures preceding harvest.

An explanation was found for this lowering in fruit quality and for the inhibition in the rate of fruit growth by excessive warm night temperatures during Stage III. Chemical analysis of the developing peach has indicated that there is large accumulation of carbohydrate material during Stage III.11 Since increases in warm night temperature during Stage III diminished the percentage of sucrose in the cherry fruit it is suggested that increases in night temperature during Stage III limit fruit development by limiting the available amount of sugars. On the other hand, an increase in the rate of respiration at high night temperatures would tend to deplete the sugars. In addition, since the intensity in green leaf color (amount of chlorophyll) was diminished as the night temperatures were raised during Stage III, it would also appear that the amount of photosynthate produced by the leaves was reduced by high night temperatures.

An attempt to correlate heat units based upon night temperatures above 40° F, showed that the duration of a stage was not based upon a definite number of heat units and thus could not be used to predict the completion of a stage.

Microfilm \$2.00; Xerox \$3.60. 61 pages.

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ANATOMY

AN EXPERIMENTAL STUDY OF THE EXTERNAL CAPSULE, THE EXTREME CAPSULE, AND THE CLAUSTRUM OF THE MACAQUE

(L. C. Card No. Mic 58-7683)

Joseph Jerold Berke, Ph.D. University of Michigan, 1958

This investigation is an anatomical study of the claustrum and the external and the extreme capsules. The purpose in initiating the experiments was to determine whether these areas might serve as relays and avenues of discharge from the cortical second motor areas to the red nucleus and the tegmentum of the midbrain and to gain additional information regarding the fiber components of this region.

Twelve healthy monkeys, Macaca mulatta and Macaca cynomolgus, were employed as experimental animals. Under ether anaesthesia and using aseptic surgical techniques, the destruction of one or more portions of the brain of each animal was achieved by cortical ablation with a surgical aspirator. A physical examination and neurological testing were performed before and after each operative procedure to note any sequellae. After a 10-17 day period of observation, the animals were sacrificed by injecting an overdose of rapidly acting barbiturate and were perfused with 10% formalin. The brain was removed from the cranium, sectioned coronally, and stained using the Marchi technique. Serial sections were cut at 50 micra thickness. These were then studied to determine the fiber pathways from the cortical lesions.

From the frontal, temporal, anterior parietal, and insular lesions, corticotegmental fibers enter the external capsule. Some of these bundles course caudoventrally within the external capsule and then turn medially, sublenticularly or postlenticularly over the capsule of the lateral geniculate nucleus to reach the red nucleus and the tegmentum of the midbrain. Others pass from the external capsule across the putamen into the ansa lenticularis, and still other fascicles, on leaving the external capsule, continue ventrally toward the base of the hemisphere before turning into the ansa lenticularis. Degenerated fibers from the more posterior lesions were followed through the pulvinar, the lateral thalamic nucleus, and nucleus ventralis posterior pars lateralis of the dorsal thalamus into the tegmentum around the red nucleus.

The extreme capsule contains fibers that interconnect the frontal and parietal lobes with the temporal and insular cortices. A very few fiber contributions from the extreme capsule appear to join the corticotegmental projection system adding to the fibers in the external capsule as the external and the extreme capsules become confluent.

The fibers that terminate in the claustrum from the frontal, temporal, and insular areas, are not numerous. Probably short collaterals are exchanged with the insular cortex and the putamen. Area 22, premotor cortex, and frontal areas rostral to the precentral gyrus contribute fibers to the claustrum. Most of these are fibers of pas-

sage. Silver preparations showed no definite fibers beginning or ending within the claustrum.

From this series of experiments, it appears evident that:

- 1. The external capsule is composed primarily of corticotegmental fibers. A few cortical association fibers are present. The external capsule assumes importance due to the fascicles it receives from Area 4 and from the supplementary motor areas as a discharge pathway into the tegmentum of the midbrain. It becomes clinically significant when lesions of the genu and the posterior limb of the internal capsule and destruction of the basal ganglia occur. In the external capsule, a considerable number of fibers are spared which may make gross motor responses possible through their discharge to motor centers by way of the tegmentum.
- 2. The extreme capsule is primarily a cortical association bundle.
- 3. The claustrum does not appear to be a region of synapse for the discharge of extrapyramidal systems from the cortical second motor areas. No significant fiber connections could be demonstrated for the claustrum.

Microfilm \$2.00; Xerox \$6.40. 135 pages.

CYTOMORPHOSIS OF PORCINE SPERMATOZOA AS RELATED TO ARTIFICIAL INSEMINATION

(L. C. Card No. Mic 58-7562)

James Edgeley Lovell, Ph.D. Iowa State College, 1958

Supervisor: R. Getty

The life history of porcine spermatozoa was studied. Five boars were castrated to obtain material to study histological sections of testis, epididymis and vas deferens. Smears of epididymal fluid were stained to study spermatozoa in the epididymis. Ejaculated spermotozoa were studied by various histological and histochemical methods. Five sows were bred naturally and slaughtered after varying intervals of time, the following material was studied; smears of uterine contents; histological sections of uterus, oviduct, and ovary; and saline solution flushed through the oviduct for the detection of spermatozoa. Histochemical reactions of male and female genital tract are described and illustrated. A total of 44 sows were artificially inseminated with fresh semen within two hours after collection. The possible physiological role of the various parts of the male and female genital tract in furnishing nutrition for spermatozoa is discussed. The following conclusions merit emphasis:

1. The amount of seminal plasma adhering to the sperm cells produced a variation in the reaction for alkaline and acid phosphatase.

- 2. No glycogen was demonstrated in the boar spermatozoon at any stage of its life history.
- 3. Sudanophilic material is present in the middle piece and protoplasmic droplet.
- 4. The presence of acid and alkaline phosphatase reaction and glycogen in the cytoplasm of Sertoli cells and in the basement membrane of the seminiferous tubules was interpreted as evidence of the metabolic pathway of materials for spermiogenesis.
- 5. Secretory activity of the epididymal epithelium was demonstrated by an abundance of lipid, glycogen and phosphatase in the cytoplasm.
- 6. The presence of acid and alkaline phosphatase and glycogen in the surface epithelium of the uterus, glandular tubules, and oviduct is evidence of secretory function.
- 7. The fluid portion of porcine semen disappears from the uterus within 8 hours after breeding.
- 8. A progressive decrease in number of spermatozoa in the uterus was observed from $1\frac{1}{2}$ hours after breeding to 27 hours after at which time only a few remained.
- 9. The rapid disappearance of spermatozoa from the genital tract of the sow is due to phagocytosis by polymorphonuclear leucocytes.
- 10. Spermatozoa were found in the isthmus of the oviduct 10 minutes after natural service.
- 11. Preliminary trials with artificial insemination using 4 sows produced 100 per cent conception at first service. More extensive trials involving 40 sows resulted in 63 per cent conception as compared with 75 per cent in a group of sows bred naturally.
- 12. Temperature change of the semen between collection and insemination was considered an important factor in the difference in conception rate between natural and artificial breeding.

Microfilm \$2.70; Xerox \$9.40. 207 pages.

CERTAIN ANATOMICAL AND PHYSIOLOGICAL RELATIONS OF THE HIPPOCAMPUS

(L. C. Card No. Mic 58-7796)

Charles Lesley Votaw, Ph.D. University of Michigan, 1958

This experimental investigation has been concerned with the possible production of somatic motor movements by stimulation of the hippocampus, and with the effects of the removal of portions or of all of this area. As an essential part of the program, the fiber connections of the hippocampus have been studied. The main objects of this investigation have been to ascertain whether this brain region can act as an independent second motor area, and to increase our present knowledge of its functions.

Twelve monkeys (Macaca mulatta and Macaca cynamolgus) were subjected to sterile operative procedures.

Stimulation of the hippocampus was carried out both by direct application of the electrode and with the use of a stereotaxic apparatus. The movements obtained were noted and photographed. Selected lesions were placed in the hippocampus following which the animal was observed for any behavioral or motor defects in the postoperative period. After suitable survival times, the animals were sacrificed, and the brain prepared according to the Marchi technique. A microscopic study of the degenerated myelinated fiber paths was then carried out.

1893

It was observed, upon proper stimulation, that there was a pattern of somatic movements on the hippocampus. The region concerned with face responses occupied the anterior two thirds of this structure. Movements of the neck and the upper extremity were obtained from the caudodorsal one third. On stimulation, the anterior part of the hippocampus gave primarily ipsilateral movements, while the posterior two thirds gave no evidence of laterality, the movements being either ipsilateral or bilateral. An arousal response was obtained from stimulation (at higher stimulus levels) over the middle third of the hippocampus. These movements were not eliminated with fornix lesions, but did disappear on separating the hippocampus from the subiculum.

Partial lesions of the hippocampus, even when bilateral, had no effect on the performance of the animals. With the complete removal of the hippocampus bilaterally, the animals became apethetic, lethargic, and lacked spontaneous movement during the postoperative period. Upon external stimulation, however, these operated monkeys reacted violently, showing an attitude of attack, which was poorly oriented and misdirected. All other functions of the animal appeared normal.

Lesions of the hippocampus produced degeneration in the body of the fornix which could be traced to the mammillary, ventromedial hypothalamic, habenular, and lateral septal nuclei, and to the diagonal band of Broca. A much larger percentage of fibers entered the precommissural than the postcommissural fornix. Intrahippocampal and interhippocampal connections were also found. An important efferent pathway was demonstrated going from the hippocampus to the hippocampal gyrus and other areas of the temporal lobe.

It was concluded that the hippocampus can act as an independent second motor area and that there is reflected, on the surface of this structure, a pattern of somatic motor movement. It is suggested that the discharge path for these movements is not by way of the fornix, but through connections with the temporal lobe. In addition, then, to the many fiber paths already reported, this study adds evidence for a definite hippocampal-temporal association system which constitutes an efferent pathway from the hippocampus to the temporal lobe. Finally, it is proposed that the hippocampus is concerned in the overall balance of discharges associated with visceral-somatic associations and in the emotional orientation of the animal to its environment. Microfilm \$2.00; Xerox \$6.40. 132 pages.

ANTHROPOLOGY

THE PROCESS OF LADINIZATION IN THE GUATEMALAN HIGHLANDS

(L. C. Card No. Mic 58-7221)

Richard Irwin Hirshberg, Ph.D. Syracuse University, 1958

Supervisor: Douglas G. Haring

A detailed study is made of the process by which Guate-malan Highland Indians take on the ways of Ladino culture and move toward Ladino group membership. First the framework within which the ladinization process operates is presented. A description is then given of two specific field sites, San Andrés Semetabaj and a Guatemala City transition neighborhood. Field data on the passage process was obtained from these localities. Next, general consid-

erations of the process of ladinization are presented. It is a two-group, uni-directional, quasi-static process. The process is then described in detail in terms of three modes: association, relocation, and occupation. A discussion is given of circumstances which promote ladinization. Alternative responses to these circumstances (that is, responses other than quasi-static ladinization) are then presented. Finally a connection is suggested between the ladinization process and stability in the Indian-Ladino structure.

The study is the first detailed analysis of the process of ladinization in the Guatemalan Highlands. A rough estimate of the ladinization rate is made, and it is shown that in the two places studied knowledge of Indian antecedents in ladinized individuals does not preclude their acceptance as Ladinos. It is suggested that quasi-static ladinization exerts a stabilizing effect on Indian culture.

Microfilm \$3.85; Xerox \$13.00. 298 pages.

BACTERIOLOGY

A STUDY OF SALMONELLA PULLORUM AND PULLORUM DISEASE IN THE CHICK EMPLOYING INFRARED SPECTROSCOPY

(L. C. Card No. Mic 58-7595)

J. A. Cameron, Ph.D. The University of Tennessee, 1958

Major Professor: D. F. Holtman

A study of the endotoxins of a number of strains of Salmonella pullorum was undertaken to determine the nature of the toxic portion of the preparation and its importance to the virulence of the organism. The virulence of strains 3522/51, NEC 17, NJ 242, Mont 4232, WVa 533, Minn 607, and Ky 5159 was determined and compared with the toxicities of the Boivin endotoxins of these strains. The avirulent strain NEC 17 produced an endotoxin which had a potency of the same magnitude as that of the virulent strain 3522/51. The yield of endotoxin from strain NEC 17 was 2.94 per cent while that of strain 3522/51 was 4.14 per cent.

A comparison of the other strains of S. pullorum, which were highly virulent, or of intermediate virulence, indicated that the variations in virulence were due to differences in the endotoxin rather than to a reduced amount of endotoxin. Infrared spectra of the endotoxins revealed only minor differences. The biological differences of the preparations were correlated with the presence of an absorption peak at 6.9 microns. The peak was tentatively identified as being characteristic of the presence of hydroxyl groups.

The infrared spectra of homogenized livers and spleens of normal, normal fasted, infected and intoxicated chicks were compared. Spectroscopic evidence showed that the glycogen level of the infected and intoxicated chicks was drastically reduced, while that of the normal fasted chick was reduced to almost the same level.

The occurrence of fatty infiltration of the liver was noted in the case of the intoxicated and normal fasted chicks. No major changes in the infrared spectra of the spleens of the chicks were found.

Microfilm \$2.00; Xerox \$4.00. 72 pages.

EXPERIMENTAL AIR-BORNE SALMONELLA INFECTIONS OF CHICKS

(L. C. Card No. Mic 59-612)

Dorothy Iker Clemmer, Ph.D. Tulane University, 1958

Chairman: Morris F. Shaffer

Enteric infections are ordinarily considered to be transmitted by ingestion of contaminated food or water but this means of transmission in certain instances has proved an inadequate explanation for the spread of salmonellosis. One such instance is the smoldering hospital epidemic where cases may occur sporadically over a long period of time and no focal point or vehicle of infection can be

determined. A second example is the spread of "Bacillary White Diarrhea", caused by <u>Sal. pullorum</u>, among chickens. Investigators studying this disease in the laboratory have found it necessary to use extremely large oral doses to achieve infection which seems at variance with its highly contagious nature under field conditions. In both cases, the air-borne transmission of the pathogen has been postulated.

The present study was prompted by the recovery of Sal. tennessee from one of many air samples taken during a hospital nursery epidemic. Since previous work in this laboratory had established the baby chick, inoculated by the oral or intraperitoneal route as a sensitive laboratory model for the study of salmonellosis, it was planned to determine whether or not these animals were equally susceptible to infection when exposed to aerosols of Salmonella organisms.

Aerosols of Salmonellae were generated from broth cultures or broth suspensions by a Darby-type nebulizer. For determination of the concentration of bacteria in the resultant cloud, samplers of the capillary impinger type were used. The ratio of the numbers of organisms recovered from the cloud to the number nebulized indicated that in general, less than 10 per cent of the Salmonella organisms survived in droplet nuclei. In order to calculate the theoretical dosage inhaled, it was necessary to determine the minute respiratory volume of baby chicks. This value was found to be in the order of 62 ml./min. The actual numbers of organisms inhaled and retained were determined by sacrificing a random group of chicks immediately after exposure to the aerosol and making cultures of the lung tissue using quantitative techniques. The course of infection was followed by bacteriologic examination of the feces, liver, spleen and heart's blood for the presence of Salmonellae, and quantitative estimation of the numbers of organisms in the lungs. Similar bacteriologic procedures were followed in orally inoculated birds to reveal the similarities and differences of the infection resulting from the two routes of inoculation.

The first "respiratory" experiments were done with Sal. typhimurium 5609, a strain originally isolated from spray-dried egg powder and known to be highly infectious for baby chicks by the oral and intraperitoneal routes. After inhalation of as few as 70 viables, the organisms multiplied in the chick lung tissue until 103 to 104 viables could be recovered during the acute phase of the infection, 4 to 6 days post-exposure. The numbers of bacteria slowly declined thereafter but small numbers of organisms could still be recovered from the lungs of birds sacrificed two and three weeks after infection. Comparison of the data from chicks exposed to aerosols, especially those in experiments where large dosages (e.g. 103 viables) were used, with data from chicks inoculated per os revealed that the initial presence of organisms in the lungs accelerated the hematogenous spread of infection to the liver and spleen. Of interest was the observation that in chicks inoculated per os, almost equally large numbers of Salmonella organisms were recovered from the lungs as from the lungs of chicks exposed to aerosols indicating that foci in the lungs, as well as other organs, could result from enteric infection. The mortality in the "respiratory" experiments was not significantly higher than following oral in-

The majority of the other Salmonella strains tested, single strains of Sal. montevideo, Sal. meleagridis, Sal.

muenchen, Sal. enteritidis and Sal. paratyphi B, behaved not unlike Sal. typhimurium 5609. In single experiments, Sal. heidelberg caused higher mortality among birds exposed to aerosols than inoculated orally. Sal. typhimurium 1406, a strain known to be as infectious and virulent by the oral route as Sal. typhimurium 5609, proved unusually inactive. Sal. tennessee C.H. was of low virulence by both the oral and respiratory routes. Two strains of Sal. pullorum, a species adapted to the avian host and rarely isolated from other animals, showed a marked ability to proliferate rapidly to large numbers in the chick lung. Twenty to 70 inhaled viables infected every bird while oral dosages 100 to 1000 fold higher did not do so. Here, mortality following exposure to aerosols was at least twice that observed among birds inoculated per os.

This investigation and the investigations of others who have studied the incubator transmission of salmonellosis suggest that in nature, chicks may become infected by the inhalation as well as the ingestion of many Salmonella species. From the present observations and those recorded in the literature which show that oral infection with Sal. pullorum does not readily occur under field conditions, it would appear that in the case of Sal. pullorum, the lungs are the preferred portal of entry.

Microfilm \$2.00; Xerox \$4.20. 77 pages.

NUTRITIONAL FACTORS CONCERNED WITH GROWTH AND LECITHINASE PRODUCTION BY CLOSTRIDIUM PERFRINGENS

(L. C. Card No. Mic 58-7401) Lawrence Giles Jayko, Ph.D. University of Minnesota, 1958

Adviser: Herman C. Lichstein

Growth of the organism was found to occur in both a complex and synthetic medium with toxin production supported only in the complex medium. The Nagler reaction was established as a valid method of assay for lecithinase activity and was used routinely. Sucrose proved to be the best carbohydrate source tested for both growth and toxin promoting properties, although the organism vigorously attacked most of the carbohydrates tested. The fall in pH in the growth medium due to the accumulation of metabolic acids was found not to affect the production or stability of lecithinase.

Lecithinase production in the synthetic medium was stimulated by the addition of proteose peptone and to a much lesser degree by the addition of yeast extract. Also, enzymatically hydrolyzed casein when substituted for the amino acids of the synthetic medium, supported toxin synthesis while acid hydrolyzed casein was only partially active under these conditions. Even very mild treatment of casein with acid failed to yield a product capable of supporting toxin synthesis. The removal of phosphoric acid groups from enzymatically hydrolyzed casein with phosphatases failed to affect its ability to support lecithinase synthesis. In addition, both growth and toxigenic components of enzymatically hydrolyzed casein were found to be completely dialysable. Paper chromatography and paper electrophoresis techniques revealed no qualitative

differences between enzymatic and acid hydrolysates of casein. Fractionation of a dialysed enzymatic digest of casein with a Stein and Moore column showed acidic, basic and neutral components to be present; however, after collection, concentration and desalting of these components, no activity was exhibited by the fractions when they were tested for growth and toxin-stimulating activity.

A mixture of synthetic peptides was found to stimulate both growth and lecithinase synthesis when added to the defined medium. In this medium the amino acid concentration for optimal growth was found to be higher than that needed for optimum lecithinase production. Although increase in amino acid concentration in the synthetic medium stimulated growth of the organism it appeared to mask the stimulatory effect of synthetic peptides on lecithinase production. The dipeptide glycyl-L-asparagine stimulated both growth and lecithinase synthesis and its effect was similarly nullified by the presence of high concentrations of amino acids. Alanyl-DL-asparagine and glycyl-D-asparagine were unable to substitute for glycyl-L-asparagine in either growth or toxin production.

Under the conditions of this study it was possible to obtain toxin titers in a semi-synthetic medium approaching 50 per cent of that produced in a complex medium. However, at times there appeared to be as much toxin in the semi-synthetic medium as in the complex medium when total growth in the respective media was considered.

Microfilm \$2.00; Xerox \$3.80. 70 pages.

SOME ASPECTS OF LIPID METABOLISM OF CHICKS INFECTED WITH SALMONELLA PULLORUM

(L. C. Card No. Mic 58-7600)

Charles Dean Jeffries, Ph.D. The University of Tennessee, 1958

Major Professor: D. F. Holtman

Studies of the composition of liver lipid have been undertaken in an attempt to elucidate the physiopathology of pullorum disease. These studies included an investigation of the infrared spectra of the gross lipid, the determination of the saponification value, and the rate of incorporation of P³² labelled inorganic phosphate into the lipid of livers of two to five day old chicks infected with Salmonella pullorum. Normal chicks of the same ages served as controls.

The infrared spectra showed some differences to occur as the chicks aged, with absorption increasing at 7.8 and 9.5 μ . There were no discernible differences between the lipids extracted from the normal and infected chicks. The saponification value of the lipid from the normal chick increased slightly during the experimental period while that of the lipid from the infected chick tended to show a marked initial increase followed by a dramatic decrease. Usually the final values fell below the original level. The rate at which inorganic phosphate was incorporated into the lipids of the liver was appreciable, although it varied some between experiments. The rate of incorporation of the labelled orthophosphate into the lipid of the infected chick liver was higher than that of the normal chick liver.

Treatment with arginine, methionine and threonine, and with the lipotropic agents, betaine and inositol, reduced the

saponification value of the lipid from the livers of chicks infected with <u>S. pullorum</u>. The amino acids were more effective in this respect than were the lipotropic agents. Choline was highly toxic for chicks when administered parenterally and thus was not used. These agents had little or no effect on the infrared spectrum of the lipid extracted from the liver.

Arginine and methionine were the only agents employed in conjunction with the labelled inorganic phosphate. These amino acids altered the rate of incorporation of labelled phosphate into the liver lipids. In treated, infected chicks the activity was well below that of the infected chick and comparable to that of the lipid from normal chicks.

Amino acids were more effective in alleviating the abnormal occurrence of a higher saponification value than were the lipotropic agents. Thus, it is suggested that the lipid changes are incidental to other changes occurring in the disease, possibly as the result of a disturbance in protein metabolism during infection.

Microfilm \$2.00; Xerox \$3.60. 62 pages.

THE CHEMICAL, SEROLOGIC AND SKIN TEST ACTIVITIES OF POLYSACCHARIDES EXTRACTED FROM HISTOPLASMA CAPSULATUM AND BLASTOMYCES DERMATITIDIS

(L. C. Card No. Mic 58-7610)

Ralph A. Knight, Ph.D. University of Utah, 1958

Chairman: Dr. Stanley Marcus

Polysaccharides were extracted by the chemical method of Heidelberger, from each of three strains of <u>Histoplasma</u> capsulatum and Blastomyces dermatitidis. Significantly greater yields of polysaccharides were extracted from the culture broth filtrate than were extracted from the yeast phase cells.

Studies of the constituents of these polysaccharides by paper chromatography and cystiene-sulfuric acid tests for pentose and hexose, micro-Kjedhahl nitrogen and other qualitative and quantitative chemical tests suggest that the H. capsulatum and B. dermatitidis polysaccharides consisted of glucose units with an occasional glucoseamine moiety.

The capacity of the H. capsulatum and B. dermatitidis polysaccharides to produce visible antigen-antibody precipitates with homologous and heterologous antisera were investigated by the Oudin and Ouchterlony agar precipitation methods. These studies showed that the H. capsulatum and the B. dermatitidis polysaccharides reacted only with their respective homologous antibody and that each produced a single band of precipitate. These data indicated that each antigen had a specific in vitro antigenic action, with one antigenically active component.

Complement fixation and hemagglutination tests were employed using the H. capsulatum polysaccharide antigen. This study showed that the polysaccharide antigen could be used as a complement fixation antigen when hyperimmune guinea pig or rabbit sera were used as antibody. Hemagglutination test results were not reproducible.

The H. capsulatum and B. dermatitidis polysaccharides

were used as skin test antigens. The intradermal injection of microgram amounts of these polysaccharides into guinea pigs infected with either H. capsulatum or B. dermatitidis produced skin test reactions equal to those given by the standard histoplasmin or blastomycin. A study of the skin test cross reaction of the H. capsulatum polysaccharides and B. dermatitidis polysaccharides in the guinea pigs infected with B. dermatitidis or H. capsulatum revealed specific skin test reactions without significant cross reactivity. H. capsulatum and B. dermatitidis polysaccharide antigens were injected intradermally into 136 human volunteers. Twenty positive reactions were observed and a comparison of the extent of induration produced by histoplasmin and 10 mcg of H. capsulatum showed that the H. capsulatum polysaccharide produced skin test reactions equal to those observed with histoplasmin. Specific B. dermatitidis skin test reactions were not observed; however, minor skin test reactions were observed following injection of the B. dermatitidis polysaccharides in a few persons who showed strong reactions with H. capsulatum skin test materials. These studies suggest that fungal polysaccharides, isolated by relatively simple chemical methods, may be more suitable for use as skin test antigens than the currently available preparations of histoplasmin and blastomycin. Microfilm \$2.00; Xerox \$5.60. 111 pages.

THE EFFECT OF IMMUNIZATION ON DEFENSE MECHANISMS AGAINST INFECTIOUS DISEASE IN IRRADIATED ANIMALS

(L. C. Card No. Mic 58-7954)

Eugene Hafen Perkins, Ph.D. University of Utah, 1958

Chairman: Dr. Stanley Marcus

It has been found that immunization with K. pneumoniae prior to x-irradiation, increased the resistance of mice to challenge with an aerosol of virulent organisms of this species. Subsequent studies showed that active immunization prior to x-irradiation increased the resistance of mice to infection via the oral route with S. typhimurium or B. tularense. It was noted that as the radiation dose levels were increased, there was a progressive fall in the resistance of both normal and immunized animals. The greater the radiation dose the greater was the susceptibility to infection, and the less was the protection offered by the immunization procedure. However, this protective effect of preradiation immunization was not destroyed at sublethal to near midlethal levels of exposure, i.e., levels at which mortality resulting from overwhelming infections are implicated as an important cause of death.

In these experiments it was found that chronic exposure (to 900 r) given in regular small increments was far less detrimental to host defenses than smaller lethal doses acutely administered. The hypothesis has been enunciated that a critical minimal radiation exposure threshold exists with relation to infection. Below this threshold no demonstrable damage to the host defense mechanisms is present, since a dynamic equilibrium between radiation injury and biological repair is maintained. This equilibrium can be destroyed by excessive irradiation doses thereby impairing the ability of the host to resist infection.

If antibiotic therapy (penicillin, 5000 units and streptomycin, 5 mg) was utilized in conjunction with specific immunization the ability to protect mice was greater than when either of these measures were used independently.

Immunization of mice with a vaccine prepared against two strains of E. coli isolated from the blood of lethally radiated mice failed to enhance resistance against normal endogenous invasion resulting from radiation (LD₆₆) injury as measured by 30 day mortalities.

Experiments designed to determine the effect specific immunization might have upon the bactericidal activity of sera from normal and x-irradiated rats demonstrated that immunization did not enhance the bactericidal activity of these sera and in no way reversed the depressed bactericidal action of sera following irradiation exposure. Furthermore investigations to determine if the depression of serum bactericidal activity can be temporally related to, or is merely coincident with the onset of bacteremia in the irradiated animal revealed no correlation between the onset of bacteremia to decreased serum bactericidal activity.

It was found that induced agglutinin titers for human type A erythrocytes were not decreased by x-irradiation 3, 7, 11 or 15 days following irradiation exposure in albino rats. Sera from mice immunized against K. pneumoniae and then subjected to lethal irradiation was just as effective in passive immunization for prevention of death in recipient animals as was sera from immunized non-irradiated mice. Passive immunization of mice which had received low levels of irradiation (300 or 400 r) proved just as effective a measure for protection as did active immunization. At higher levels antibody (passive immunization) afforded no protection whereas active immunization enhanced resistance.

It was observed that a cellular infiltration of phagocytic cells induced in the peritoneum of x-irradiated mice by injection of a glycogen saline solution enhanced the resistance of these animals to a later challenge infection with K. pneumoniae. A single intraperitoneal injection of heterologous leukocytes administered on any given day in the first postirradiation week failed to significantly reduce mortality of non-challenged irradiated mice. However, animals which received two intraperitoneal injections of homologous phagocytic leukocytes at critical postirradiation periods exhibited reduced mortalities.

Investigations carried out in vitro and in vivo demonstrated that phagocytic cells of actively immunized animals had an enhanced phagocytic function independent of demonstrable agglutinating antibody.

Microfilm \$2.15; Xerox \$7.60. 162 pages.

STUDIES ON ENTEROVIRUSES IN LOUISIANA, MISSISSIPPI AND ARKANSAS

(L. C. Card No. Mic 59-619)

Louis Potash, Ph.D. Tulane University, 1958

Chairman: John P. Fox

This study represented an effort to separate into two groups, by available la oratory diagnostic methods, a large group of patients whose illnesses led their physicians to suspect poliomyelitis: those truly infected with poliomyelitis

and those whose illnesses were due to some other agent or agents. Further, it involved a special effort to bring to bear the available laboratory methods in an attempt to determine the etiologic agents responsible for the non-polio illnesses.

Using tissue culture methods (monkey kidney tissue), efforts were made to recover viral agents from the available fecal specimens and to identify and characterize these agents. In addition, serologic methods were employed to exclude the more obvious agents -- LCM virus, mumps virus, etc. -- heretofore associated with the aseptic meningitis syndrome. Two supporting types of evidence were sought to assist in evaluating the etiologic role of the numerous cytopathic agents isolated. First, the paired sera of the strain donor were tested for antibody response. Second, for a portion of the group, a healthy control population was chosen on a matching basis to provide some indication of the prevalence of these agents in the "normal" population.

The examination of the fecal specimens from 532 patients from Louisiana, Mississippi and Arkansas resulted in the recovery of 313 cytopathic agents. All but 16 of these viruses could be identified as polioviruses (216), Coxsackie (48), ECHO (28) or adenoviruses (5). These included 4 instances wherein the same specimen yielded 2 polioviruses, 1 instance wherein the same specimen yielded 2 non-polioviruses and 6 instances wherein the same specimen yielded both polio- and non-polioviruses. Of primary interest were the 96 patients with diagnoses of paralytic polio (22), non-paralytic polio (64) and other clinical syndromes (10) from whom the 97 non-polioviruses were recovered.

The paired sera of these 96 patients were tested for antibody responses to the donor viruses, the polioviruses, EEE, LCM, mumps V and herpes simplex antigens. A number of criteria were employed to assist in the interpretation of these serologic results. For 59 patients the assumption of causal relationship of disease to the nonpoliovirus isolate could not be supported, either because the absence of sera precluded the essential serological studies (25) or because the evidence also indicated current or recent poliovirus infection (34). Recent poliovirus infection was considered reasonably excluded in 31 patients and no poliovirus antibody at the 1:8 dilution could be detected in 6 patients. However, true infection with the nonpolioviruses isolated, as evidenced by homologous serologic response, was demonstrated in 25, not demonstrated in 2 (ECHO type 4 viruses isolated) and not measured in 11 patients. The other agents could not be implicated in the disease syndromes presented by the patients.

A causal relationship between non-polio agents and disease remained reasonably likely in 5 cases of paralytic disease and was strongly suggested in 20 cases of non-paralytic-like disease. The etiologic associations were strengthened by comparing results with those of other investigators. The difficulties involved in assuming causal relationships in those instances wherein agents are isolated only from fecal specimens and only from sporadic cases are discussed.

Although no significant differences could be shown in the frequency of isolation of any specific non-poliovirus from patients and from a carefully matched healthy control population drawn from Southern Louisiana, the considerably more frequent recovery of Coxsackie B-3 virus from the patients is at least suggestive of an etiologic role. It was possible to confirm the identification of most of the viral agents isolated. The importance of the process of confirmation is discussed, especially in the light of our present knowledge as regards simian agents.

Microfilm \$2.00; Xerox \$5.20. 102 pages.

DERIVATION AND STUDY OF PROLONGED, INAPPARENT MUMPS VIRUS INFECTIONS OF HELA CELLS GROWING IN TISSUE CULTURE

(L. C. Card No. Mic 59-644)

Harvey Rabin, Ph.D. Temple University, 1958

This study of virus-cell interaction in tissue culture was initiated in an attempt to shed some light on four important areas of medical virology which at present are not clearly understood. These are:

- 1) The prolonged immunity which follows many viral infections.
- 2) The role of antibody and phagocytes in viral infections.
- 3) The failure of viruses to completely destroy tumors when used as oncolytic agents in human cancer.
 - 4) Some virus caused malignancies of mice.
- 1) One of the most striking examples of prolonged immunity to viruses can be seen in the fact that eskimos still had circulating neutralizing antibodies to type 1 poliovirus from infection which had occurred about forty years before. They apparently had had no re-exposure to the virus since the original infection. While it has been theorized that antibody can be manufactured after antigen is gone from the body it also is possible that the virus remains in the body providing a constant antigenic stimulus as a "latent" virus meaning it is not readily detectable and is not causing disease.
- 2) The studies on the disease agammaglobulinemia have brought to light what is apparently a major difference between viral and bacterial infections. In agammaglobulinemic patients most viral infections procede as in normal individuals while bacterial infections are usually quite severe. The reasons for this are not known but it is possible that antibody and phagocytes do not have an important role in the recovery from viral infections. It may be that the cells in an infected tissue are not uniform in susceptibility to the infecting virus. Some cells are destroyed and some cells are not. This resistance on a cellular level could theoretically account for recovery.
- 3) The failure of viruses as oncolytic agents to date has many possible interpretations. However, here again it is possible to suppose that heterogeneity in viral susceptibility among the cells would enable the tumor to overcome the virus.
- 4) An area in which viral "latency" seemingly must be involved is that of some virus caused malignancies of mice. Here the virus is inoculated into very young animals but the onset of disease does not occur until months later.

What happens in the body concerning virus-cell interactions in regard to cellular recovery and the nature of

viral "latency" is unknown. There are, however, data on these points which have been obtained in tissue culture. This information though is very limited. Therefore, it was my intention to study cellular resistance of cells in tissue culture to a virus to which the cells as a whole were very susceptible. I wished to see if any cells could resist the infection and if the virus would continue to multiply in these cells.

I chose as my experimental system mumps virus and HeLa cells since mumps virus is very destructive in HeLa cells. The results of my study showed that a very low percentage of cells survived the virus induced destruction. These cells when grown out were shown to be both resistant to the virus and to be carriers of the virus in an inapparent fashion. The cells were susceptible to type 2 poliovirus and Coxsackie B-1 virus. Attempts were made to explain the nature of the carrier system and information consistent with an interpretation of non-lethal virus multiplication in the cells was obtained.

The true identification of the virus referred to as mumps virus in this paper is currently in doubt. It may be one of a group of newly described viruses closely related to mumps. This is being investigated.

Microfilm \$2.00; Xerox \$3.80. 68 pages.

THE PRODUCTION OF ANTIBODIES IN THE BOVINE MAMMARY GLAND, THEIR USE IN PROPHYLAXIS AND THERAPEUTICS WITH SPECIAL REFERENCE TO SOME CALF PATHOGENS

(L. C. Card No. Mic 58-7409)

Mohammad Sarwar, Ph.D. University of Minnesota, 1958

The transmission of passive immunity through colostrum endows calves with some degree of protection. The antibodies in colostrum are dependent upon the nature of antigens to which the cows have been exposed. Sometimes, even with a judicious feeding of colostrum, the calves are exposed to fetal diseases and thus calf mortality runs as high as 30 per cent. A large spectrum of causal agents such as coliform bacteria and a miscellaneous collection including various species of the genera Streptococcus, Staphylococcus, Pasteurella, and Corynebacterium is mostly responsible for diseases in calves. The study herein reported of 30 colostrum samples from 3 different herds revealed that the colostrum is deficient and is limited to a few antibodies as compared to the multiple pathogens responsible for the incidence of calf diseases. The response to effective stimulation of induced multiple antibodies in milk may provide passive immunity against several calf diseases.

Six lactating cows were infused at weekly intervals with 2 cc. per quarter of polyvalent antigen, i.e., bacterin, consisting of P. boviseptica, E. coli, Streptococcus hemolytic, Staphylococcus albus, Staphylococcus aureus, and Corynebacterium having a density of McFarlan No. 7. Another group of 3 cows were infused with this polyvalent antigen at 15 day intervals. Four additional cows were infused with 1 cc. of the same mixed antigen at weekly intervals.

The antibody response resulted in all cows within 24 to 36 hours. All cows which received 2 cc. mixed antigen

maintained a constant antibody level for 9 to 10 days, after which the level receded. Antibody response with 1 cc. was similarly rapid and depleted in 3 days, and the titers were lower than obtained with the 2 cc. dose.

Four of 4 control calves fed on normal milk died when challenged with 50 cc. live E. coli. Eight colostrum-free calves (from birth to 5 months old) were allowed to suckle for 2 to 3 days cows (antibody donors) previously infused with polyvalent antigen. These showed absorption of antibodies through the gastrointestinal tract. When challenged orally with 50 cc. live E. coli, 7 of 8 experimentals showed protection and 3 of 3 controls died. In another experiment, calves fed pooled antibody milk ad lib. for 3 days, demonstrated antibody absorption. Five of 5 experimental calves survived when challenged orally with 50 cc. of live E. coli, whereas 2 of 2 controls died. In a study of the prophylactic value of gamma globulin, 6 experimental colostrumfree calves were injected intravenously for 3 days with 0.5 gram per 100 pounds of body weight of gamma globulin specified against polyvalent antigen. Of the experimental and control calves challenged with 50 cc. (density already stated) of live E. coli, 5 of 6 experimental calves survived and 2 of 2 controls died. The study of the therapeutic value of gamma globulin showed that 6 colostrum-free calves infected with 50 cc. of live E. coli developed clinical symptoms of scours and pneumonia. At the height of the disease, 0.5 gram gamma globulin specific against E. coli was injected intravenously into the experimental calves for 3 days, which resulted in survival of 3 of 4 experimental calves, but 2 of one control died. In another experiment, 5 of 5 experimental calves survived when 0.5 gram of gamma globulin specific against E. coli was injected intravenously for 3 days. Of 3 controls, 2 survived and 1 died. The surviving calves developed acute arthritis of joints, and their growth was retarded.

Microfilm \$3.30; Xerox \$11.20. 255 pages.

THE EFFECT OF ENZYME INHIBITORS AND GROWTH FACTORS ON VIBRIO FETUS, PROTEUS VULGARIS AND PSEUDOMONAS AERUGINOSA AS RELATED TO THE DIAGNOSIS OF BOVINE VIBRIOSIS

(L. C. Card No. Mic 58-7424)

Raimunds Zemjanis, Ph.D. University of Minnesota, 1957

Bovine Vibriosis is a disease of cattle associated with reduced fertility. The disease is caused by Vibrio fetus. The extent and the significance of the disease is not clear, primarily due to difficulties encountered in making a diagnosis. The serological methods are believed to be unreliable because of the lack of antigenic specifity of the organism. Bacteriological isolation is considered as the most reliable means of detecting Bovine Vibriosis. Great difficulties, however, are experienced also in the attempts to arrive at a diagnosis by bacteriological examination. Two major factors cause these difficulties. The causative agent grows at a very slow rate on conventional media. Secondly, the samples obtained from the genital tract are practically always contaminated. The frequent occurring overgrowth of contaminants obscures the Vibrio fetus colonies.

The present study was designed to investigate the possibility of overcoming both factors interfering with the isolation of Vibrio fetus. Proteus vulgaris and Pseudomonas aeruginosa, because of their frequent occurrence in the samples collected for bacteriological examination, were selected as representative of the contaminants. Past attempts to develop selective media for cultivation of Vibrio fetus have met with failures because of the considerable resistance of these bacteria to common disinfectants-and antiinfective drugs. Since the value of enzyme inhibitors in this respect has not been studied, the first part of this investigation was planned to include a study of their effect on the growth of Vibrio fetus, Proteus vulgaris and Pseudomonas aeruginosa. Brucella Broth(R) (ALBIMI) with 0.1% agar added served as the basal medium. This medium was found to provide the most favorable environment for Vibrio fetus among the media screened in a preliminary study. Enzyme inhibitors were incorporated in this medium in anticipation that a substance might be discovered which selectively depressed the growth of one or both of the contaminants without adversely affecting the growth of Vibrio fetus. The enzyme inhibitors employed included sodium azide, sodium fluoride, semicarbazide, hydroxylamine, mercuric chloride, copper sulfate, p-chloromercuribenzoate, sodium arsenite, iodoacetate, iodosobenzoate, 2,4dinitrophenol, ethylenediamine tetraacetic acid, zephiran, TEADA (an anionic detergent), malonate, isonicotinic acid hydrazide, 2,6-diaminopurine, N-ethylmaleimide and 2,3,5triphenyltetrazolium chloride. The effect of these agents was tested in both aerobic conditions and a gaseous environment containing 15% of carbon dioxide.

All the substances studied proved to be more toxic for Vibrio fetus than Proteus vulgaris and Pseudomonas aeruginosa. This observation implies that the enzyme inhibitors tested have no value as ingredients in selective media for isolation of Vibrio fetus.

The second part of this investigation was devoted to a study of the effect of selected growth factors in the growth of Vibrio fetus, Proteus vulgaris and Pseudomonas aeruginosa. The objective was to investigate the possibility of increasing the growth rate of Vibrio fetus by enrichment of the basal medium with various growth stimulating agents. Among the substances studied were glutathione, cysteine, magnesium, manganese, iron, molybdenum, cobalt, pyruvate, lactate, oxalacetate, fumarate, α-ketoglutarate, glutamate, aspartate, glutamine, uracil, thymine, adenine, paminobenzoic acid and 17-\(\beta\)-estradiol. When added individually to Albimi Broth these findings appear to indicate that an improvement of the conventional media is possible. It can be anticipated that the increased growth rate of Vibrio fetus on such improved media would increase the number of recoveries of the organism from infected ma-Microfilm \$2.30; Xerox \$8.00. 175 pages.

BIOLOGY - GENETICS

A COMPARISON OF DIRECT VERSUS INDIRECT SELECTION FOR DDT RESISTANCE IN DROSOPHILA MELANOGASTER MEIGEN

(L. C. Card No. Mic 59-699)

Cecil Jackson Bennett, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor James F. Crow

A heterogeneous stock of Drosophila melanogaster Meigen, was produced by combining 26 non-resistant laboratory and wild strains, was proliferated in population cages and sub-populations extracted for selection. Samples of each of an initial group of 46 pair mating progenies were tested in vials lined with DDT-impregnated paper to determine resistance to kill. The untested sibs from the 20 most resistant and the 20 least resistant progenies were used to make up 50 pair matings to start each of the prospective lines (High = resistant, Low = susceptible). Similar testing and selection was carried out on subsequent generations for each line. After the first generation each line was duplicated, thus two High and two Low Lines, all from the same population, were selected. Selection was carried on for 15 generations. At the end of this period the median lethal doses for the High Lines were approximately 125 and 625 times as great as those for their respective paired Low Lines, and more than 30 times as great as the median lethal dose for the control stock. Two

population cages were subjected to direct contact with DDT and samples tested during the same period.

The resistance developed by sib-selection compares favorably with the resistance of a variety of lines from our, and other, laboratories that were produced by direct selection.

Comparison to DDT resistance of other species indicate that <u>D. melanogaster</u> can, and has, achieved resistance to DDT comparable to that of species of economic and health importance.

There has been some question as to whether the resistance to insecticides is due to pre- or to post-adaptation, that is to say, whether the insecticide simply selected resistant variants already in the population, or somehow induced the resistance. The weight of indirect evidence has favored the first hypothesis, but this study adds evidence of a more definitive sort. Since, in the sibselected lines the direct ancestors of the resistant strain had never been in contact with DDT, the insecticide could not itself have been the direct cause of the resistant variants. That a strain could be produced by this procedure, that is as resistant as those developed by direct selection, shows that the pre-adaptation hypothesis is sufficient to explain the results.

Microfilm \$2.00; Xerox \$4.60. 88 pages.

DISTRIBUTION AND PROPERTIES OF ISOCITRITASE IN PLANTS

(L. C. Card No. Mic 58-7964)

Will Dockery Carpenter, Ph.D. Purdue University, 1958

Major Professor: Harry Beevers

This thesis was concerned with four different aspects of the investigation of the enzyme isocitritase. The first was an investigation of the extent to which isocitritase activity was found in plants. The second was the study of the fate of isocitritase activity in several germinating seedlings where it was found in large amounts. A purification procedure of isocitritase from a source yielding a crude preparation of high specific activity was developed. The fourth and last portion involved a study of various properties of isocitritase.

Assays of isocitritase activity were made using preparation from 25 plant sources. It was found that isocitritase activity was limited to only those plant tissues which could be assumed to be actively consuming fat such as germinating seedlings that contain large amounts of fat as food reserve. Those tissues which are not metabolyzing fat, including roots, leaves, stems, and maturing fatty seeds, yielded preparations with no isocitritase activity.

When isocitritase activity was followed in the germinating seedlings of the castor bean, cottonseed, and pumpkin seed, it was found that the isocitritase activity increased from a very low level in the seed to a peak after about 4-5 days. Thereafter the activity fell off steeply to a very low level. From the investigation of the distribution of isocitritase in plants, and by following the development of isocitritase activity in several germinating seedlings, we may conclude that isocitritase is not of widespread occurrence in plants, but rather is limited to those plant tissues in which fat is being consumed. In some of these tissues, moreover, its appearance in highest activity coincides with the period of most active conversion of fat to carbohydrate.

A procedure to obtain partially purified isocitritase preparations from five day old castor bean endosperm was developed involving alternate ammonium sulfate fractionations and $Ca_3(PO_4)_2$ gel treatments. The use of this method gave an 18-30 fold purification.

Various properties of isocitritase were investigated using enzyme preparations purified by the above method. It was shown that isocitritase has a sulfhydryl requirement, and that cysteine and glutathione are equally effective in satisfying this requirement. A divalent ion requirement was also demonstrated, with Mg⁺⁺ proving to be the most effective of the ions tested. Co⁺⁺, Mn⁺⁺, and Fe⁺⁺ were effective only to a lesser extent.

The pH optimum for isocitritase was shown to be 7.5. Isocitritase proved to be unstable when exposed to temperature of 40° C. or higher.

In a study of the effect of substrate concentration on the velocity of the isocitritase reaction, d isocitrate, dl isocitrate, and dl plus allo isocitrate were used as substrates. It appeared that the 1 form acted in the manner of a competitive inhibitor, whereas the allo forms appeared to be without effect on the isocitritase reaction, except at higher concentrations.

The Km was determined to be 3.4×10^{-3} M. The effect of temperature on the isocitritase reaction

was studied over a temperature range of 10-25° C. The energy of activation was computed on the basis of two different types of assay, and was found to be approximately 9350 calories.

In a study of the reversibility of the isocitritase reaction, labeled isocitrate was produced when 2,3-C¹⁴ succinate and glyoxylate were incubated with isocitritase. When this assumed isocitrate was incubated with fresh isocitritase, labeled succinate appeared in quantity.

Malonate was added to the reaction mixture, together with labeled succinate and glyoxylate in the ratio of one to one, and five to one to succinate. The former concentration inhibited the formation of isocitrate slightly, while the latter concentration gave an inhibition of over 90%.

Microfilm \$2.00; Xerox \$4.40. 81 pages.

HETEROCYTOSIS IN CELLULAR SLIME MOLDS

(L. C. Card No. Mic 58-7841)

Michael F. Filosa, Ph.D. Princeton University, 1958

By isolating single spores it was found that five of the strains of Acrasiales maintained in this laboratory were heterogeneous and consisted of more than one cell type. In addition to spores producing wild type fruiting bodies, variants were found which deviated from the wild type in either the morphology of their fruiting bodies, or the morphogenetic process that gave rise to fruiting bodies.

In one strain of <u>Dictyostelium mucoroides</u> two cell types persist in ratios of a limited range over a period of many serial subcultures. It was further shown in the case of pure wild type cultures of this strain, that a new cell type arose 'spontaneously' during the course of serial subcultures and established itself firmly in the population.

The different cell types of a given strain can cooperate to form a common pseudoplasmodium, which because of its cellular heterogeneity has been called a heterocyton. Mixing the amoebae of variants with even small amounts of wild type cells results in the formation of heterocytons that will produce a fruiting body with the wild type phenotype, that is one which produces a normal stalk and sorus. Grafting experiments indicate that whenever wild type cells are involved, the final morphology of a fruiting body has the wild type phenotype.

The phenomenon of heterocytosis in these forms has been interpreted as a mechanism for storing mutants, thus providing these asexual organisms with a plasticity for possible future changes. The influence of the wild type cells on the morphogenesis of heterocytons is compared to dominance in diploid organisms.

Microfilm \$2.00; Xerox \$3.00. 37 pages:

STUDIES ON THE BIOLOGY OF THE TREMATODE FAMILY LECITHODENDRIIDAE ODHNER

(L. C. Card No. Mic 58-7976)

John Edgar Hall, Ph.D. Purdue University, 1958

Major Professor: R. M. Cable

Prosobranch snails and aquatic arthropods, mostly from the vicinity of Lafayette, Indiana, were examined for natural infections with cercariae and metacercariae respectively in a search for clues to life histories of the lecithodendriid trematodes. Following leads thus obtained, attempts were made to infect arthropods with several species of virgulate xiphidiocercariae. One, previously described as Cercaria neustica, proved to be the larva of Mosesia chordeilesia. It penetrated naiads of the mayfly, Hexagenia limbata, and encysted within 1 hour of penetration. With development in the naiad, cysts increase in diameter from approximately 0.1 mm. to 0.2 mm. Experimentally infected naiads containing metacercariae at least 42 days old were fed to 6 newly hatched chicks and 1 young hamster, all of which yielded ovigerous adults of M. chordeilesia when examined 3-28 days later. The wood pewee (Contopus virens) was found to be a natural host of M. chordeilesia in the area where infected snails were obtained. Attempts to infect the molluscan host by feeding embryonated eggs were unsuccessful. Stages in the life history are described and the genus Mosesia is redefined.

Twelve virgulate cercariae in addition to that of M. chordeilesia are reported, 10 as new species. They are Cercaria tremaglandis n. sp., C. papiliogona n. sp., C. adoxovirgula n. sp., C. neusticoides n. sp., C. pyxiceps n. sp., and C. cordivirgula n. sp., all from Pleurocera acuta; Cercaria bryobulga n. sp., from Goniobasis sp.; and Cercaria notura n. sp., C. pinguisoma n. sp., and C. celatoglandis n. sp. from Goniobasis livescens. The remaining 2 are C. tranoglandis Seitner, and C. meringura Seitner which are re-described. The excretory pattern was determined for 9 species and found to be either 2[(2 + 2 + 2) + (2 + 2 + 2)] or 2[(3 + 3 + 3) + (3 + 3 + 3)]. The various species are differentiated and a key to the virgulate cercariae of North America is given.

Seven probably different species of metacercariae were found as natural infections in a survey of aquatic arthropods. One, the metacercaria of a species of Eumegacetes, occurs in dragonfly naiads; another which develops precociously, free in the body cavity of naiads of the damselfly, Hetaerina americana, is described as Neoprosthodendrium progeneticum n. g., n. sp. The remaining 5 metacercariae were not sufficiently developed to be identified more precisely than as being lecithodendriids, but are described, and some of them are figured as an aid to further studies of life histories in that group.

Microfilm \$2.00; Xerox \$4.80. 93 pages.

SYNTHESIS OF CELL WALL CONSTITUENTS BY PENICILLIUM CHRYSOGENUM

(L. C. Card No. Mic 58-7978)

George William Jourdian, Ph.D. Purdue University, 1958

Major Professors: Henry Koffler and Harold R. Garner

The fate of glucose as it concerns the formation of the cell wall constituents chitin and a polymer or polymers of glucose during the growth of Penicillium chrysogenum was studied. Cells were permitted to metabolize glucose-1-C¹⁴, and glucose-2-C¹⁴ for 3 and 60 hours, and glucose-6-C¹⁴ for 60 hours. Cell fractions were prepared by a physical method employing high speed shaking with glass beads in the Nossal apparatus. The cell wall polysac-charides (mainly chitin and polymers containing glucose, galactose, and mannose) were hydrolyzed, the hydrolytic products were purified by paper chromatography, and the glucose and glucosamine obtained were degraded by a combination of biological and chemical means.

Interest in the fate of glucose as it concerns the formation of chitin, a polymer of N-acetyl-D-glucosamine, prompted an investigation of means for the carbon by carbon degradation of D-glucosamine. Leuconostoc mesenteroides seemed a suitable organism for this purpose because of the manner in which it ferments various sugars. Optimum fermentation conditions for D-glucosamine were found to be essentially the same as those reported for Dglucose by DeMoss, Bard, and Gunsalus [J. Bacteriol., 62, 499-511 (1951) 7. Resting cells previously grown in a medium containing glucosamine were found to convert each mole of glucosamine to one mole each of carbon dioxide, compounds containing two carbon atoms (ethyl alcohol and acetic acid in a ratio of 4:1), lactic acid, and ammonia. The carbon dioxide arises from carbon atom 1 of glucosamine, carbon atoms 2 and 1 of the ethyl alcohol and acetic acid arise from carbon atoms 2 and 3, respectively, of glucosamine, and carbon atoms 1, 2, and 3 of lactic acid are derived from carbon atoms 4, 5, and 6, respectively, of the hexosamine. This was shown by the fermentation of specifically labeled glucosamine (labeled predominantly at the first or second position), isolation of the products, stepwise degradation of the organic compounds, and determination of the percent radioactivity in each carbon atom. The distribution of radioactivity in the specifically labeled glucosamine preparations was essentially the same as that determined by degradation of the glucose prepared enzymatically from the same glucosamine preparations. It was concluded that the fermentation of D-glucosamine by L. mesenteroides and the subsequent degradation of ethyl alcohol, acetic acid, and lactic acid produced constitute a useful method for the stepwise degradation of D-glucosamine. The method was applied in learning about the fate of glucose as it concerns the synthesis of chitin.

From the distribution of radioactivity obtained on the degradation of cell wall glucosamine and glucose obtained from P. chrysogenum which was allowed to metabolize glucose-1-C¹⁴ and glucose-2-C¹⁴ for 3 and 60 hours, and glucose-6-C¹⁴ for 60 hours, it was concluded that during relatively limited periods of growth the conversion of glucose to chitin proceeds essentially directly, with only a relatively small portion of the molecules undergoing skeletal rearrangements before polymerization. Over the

complete growth period, on the other hand, a substantial fraction of the glucose molecules undergoes metabolic changes before eventual incorporation into chitin and hexose polymers. Among these changes the reactions envisaged in the hexosemonophosphate pathway appear to be the most prominent.

Microfilm \$2.15; Xerox \$7.60. 162 pages.

CYTOGENETIC STUDIES ON THE PATTERNS OF EVOLUTION IN SECTION SIMIOLUS OF THE GENUS MIMULUS (SCROPHULARIACEAE)

(L. C. Card No. Mic 58-7951)

Barid Baran Mukherjee, Ph.D. University of Utah, 1958

Chairman: Robert K. Vickery, Jr.

The numbers of this taxonomic group are found along the borders of streams and in wet places from the California Coast to the Rocky Mountains and from the Aleution Islands to Chile. The genetic relationships of the various species of this section were studied by means of chromosome counts, experimental hybridizations and the analysis of chromosome pairing in the F_1 hybrids. The chromosome number of M. guttatus was found to be n = 14. In several cultures the chromosomes were observed to undergo tetraploid-like pairing which suggest that M. guttatus is an ancient tetraploid of base numbers x = 7. It seems probable that M. guttatus is the basic form from which the others have evolved. Two of the cultures exhibited meiotic irregularities that resulted in microspores with from 13 to 16 chromosomes each. Therefore populations such as these might lead to the establishment of aneuploid populations of this species, which might in the course of time become differentiated into separate species. The taxonomic species M. lyratus, M. cordatus, M. laciniatus and M. nasutus all have n = 14 chromosomes as does M. guttatus. The five species appear to share a common genome. The various inter-specific hybrids involving these five species were fully fertile. Therefore all these five species should be included under M. guttatus. The F_1 hybrids between M. platycalyx (n = 15) and M. guttatus were moderately fertile and their chromosomes exhibited essentially regular pairing. This suggests that this species shares the same common genome as M. guttatus. M. glaucescens (5653, n = 14) does not hybridize readily

with M. guttatus and the F₁ hybrids that were formed were sterile or nearly so. However, the cytological studies indicate that the chromosomes of M. glaucescens are essentially homologous to those of M. guttatus.

The population of M. nasutus represented by culture number 5327 (n = 13) contains considerable crossing barriers that separates it from M. guttatus. Probably this n = 13 form evolved from the n = 14 form of M. nasutus presently included within M. guttatus.

The glabratus var. utahensis is the name applied to two different chromosomal races. The n = 14 form appears to have evolved from M. guttatus by gene differentiation. The n = 15 form did not cross with M. guttatus.

The South American species M. parviflorus (n = 45) appears to have evolved by polyploidy from a North American species. Apparently further evolution by aneuploidy at this higher polyploid level gave rise to another South American species M. pilosiusculus with n = 46 chromosomes.

The cytological studies and the results of the crossing experiments suggest that \underline{M} . jamesii evolved by polyploidy from some closely related species of M. glabratus group. Mimulus tilingii (n = 14) perhaps evolved from M. guttatus through the accumulation of gene differences and cryptic structural changes of the chromosomes. Culture number 5967 of M. tilingii has n = 15 chromosomes and should be recognized as a separate species. Mimulus luteus (n = 32 and n = 30, 31, 32) hybridizes more readily with M. tilingii than it does with M. guttatus. Probably this species and its horticultural derivative, M. tigrinus (n = 32) evolved by polyploidy from n = 15 form of M. tilingii.

The morphological appearance and cytological findings suggest that M. decorus (n = 24) evolved by amphiploidy from a hybrid between M. guttatus and M. tilingii and that through further aneuploid evolution this species finally became established with n = 24 chromosomes.

The chromosomes of the hybrids of M. guttatus and the species represented by culture 5063 (n = 30) formed 14 bivalents which suggest that it evolved by polyploidy from a hypothetical n = 15 form of the M. guttatus group. Since M. dentilobus (n = 16) will not hybridize with any of the cultures of Simiolus, it appears to be an evolutionary shoot from the main group of Simiolus species.

In conclusion this study suggests that all the different species studied during the present investigation possess the same basic genome. The basic chromosome number is probably n = 7. It also shows clear evidence that the pattern of evolution of this complex envolves gene mutation, or criptic aberation of the chromosomes, polyploidy and aneuploidy. Microfilm \$2.00; Xerox \$4.60. 89 pages.

BOTANY

THE IMPORTANCE OF STEM RUST RACES IN RELATION TO THE PRODUCTION OF RUST RESISTANT WHEATS FOR MEXICO

(L. C. Card No. Mic 58-7417)

Alfredo Campos, Ph.D. University of Minnesota, 1958

Adviser: Helen Hart

Wheat stem rust epidemics were frequent in Mexico prior to the Wheat Improvement Program started in 1943. Native commercial wheats were susceptible. The Program sought to develop disease-resistant wheats, prevalence and distribution of wheat stem rust races being among its first studies. During 1943-1950 races 17, 19, 38, 56, and 59 were prevalent. Other races became important after 1950, first 15B, then 49 and 139, and later 29 and 48.

Stem rust resistant wheats from different parts of the world were evaluated for disease reactions and agronomic qualities at six stations in wheat regions of Mexico. Crossing the best introduced wheats with native wheats started the breeding program.

Various wheats were inoculated with individual stem rust races in greenhouses at Chapingo, Mexico. Single isolates of races 11, 15B, 29, 48, 49, 125, and 139 were obtained from collections in Mexico, and one of 15B from Beltsville, Maryland, U. S. Sixteen parental wheats were studied, eight being introduced wheats with stem rust resistance, eight being native wheats valuable agronomically. Numerous introduced wheats of potential value as parents were in preliminary studies. Over 100 hybrids and 27 wheats selected or bred and released for commercial production were included. Seedling and adult reactions of most were determined in greenhouses and adult reactions to individual races were studied in the field.

Native parents, Aguilera, Candeal, Pelon Colorado, Colorado Bajio, Marroqui 588, Mentana, Barrigon Yaqui, and Barrigon Zamora, generally were susceptible except that the last two had seedling resistance to three or four races and adult resistance to more. Introduced parents furnished resistance to different races: Egypt 101 and Kenya 324 to 15B; Gabo, Frontana, Newthatch, Rio Negro, Thatcher, varying degrees of resistance to all except 15B; and Hope to 48 and 125. Several wheats considered potential parents had excellent seedling resistance to all rust isolates, Kenya Farmer being among the best.

Thirty-three hybrids with excellent resistance to all rust isolates but unsatisfactory agronomically were kept for breeding but remained nameless. Nearly 70 hybrids were resistant to 15B and many also had resistance to 29 and 49. Eight that became named varieties were very valuable for their resistance to all eight rust isolates: Cajeme 54, Cajeme 54A, Gabo 54, Gabo 54A, Mayo 54, Yaktana 54, Yaqui 53A, and Kentana 54.

Seedling and adult reactions sometimes disagreed in Chapingo experiments. Some disagreement was explained

by presence of Mentana in the parentage; some was thought due to temperature sensitivity of rust reactions.

Sixteen improved wheats, six parents, and five potential parents were studied in Minnesota where variability in reaction was observed at different greenhouse temperatures. Other isolates of races 11, 29, 48A, 49, and 139, also from collections in Mexico, and a Minnesota isolate of 15B were used. Yaqui 53 and Yaqui 53A were outstandingly resistant to these isolates. Again, four among the best wheats in Chapingo experiments, Cajeme 54, Cajeme 54A, Gabo 54, Gabo 54A, were resistant to four races and had temperature sensitive reactions to Minnesota 15B. Reactions of two to race 49 varied with temperature.

There were pathogenic differences between race isolates used in the two locations, particularly those of 11, 48, 49, and 139. Biotypes of races doubtless exist in Mexico. Races 11, 29, and 48 were more aggressive on more of the improved wheats than were other races. They probably have the greatest potential danger.

Improved wheats generally were resistant in field plots in Minnesota and in Chapingo or Mexe in Mexico. At Mexe, where climate affords many opportunities for natural rust infection, some of the improved wheats were severely attacked in certain years.

Microfilm \$2.00; Xerox \$5.80. 120 pages.

THE COMPARATIVE STEM ANATOMY OF SOME SHRUBBY MEMBERS OF THE GERANIACEAE

(L. C. Card No. Mic 58-3645)

Zane Bland Carothers, Jr., Ph.D. University of Michigan, 1958

The purpose of this study is to analyze some of the anatomical features exhibited by woody species in the predominantly herbaceous Geraniaceae. These species show features which are transitional to the herbaceous habit while retaining others reminiscent of their woody ancestors. Other objectives were to determine the exact nature of the fibrous "pericycle" by means of an ontogenetic study and to evaluate the usefulness of this structure as a diagnostic characteristic of the family; to obtain information on the occurrence and nature of nucleate fibers; and to investigate the internal stem structure of the four species comprising the Hawaiian section Neurophyllodes of the genus Geranium.

Anatomical descriptions are given for eleven species: viz. Pelargonium domesticum, Geranium arboreum, G. multiflorum var. canum, G. cuneatum var. tridens, G. humile var. mauiense, Monsonia burkeana, Biebersteinia odora, Rhynchotheca spinosa var. integrifolia, Wendtia gracilis, Balbisia microphylla, and Viviania crenata. Stem segments of most of these plants were obtained from herbarium specimens; these were sectioned and macerated by

the standard methods. Quantitative data on such features as cell size were expressed as mean, standard deviation and range.

Based on the material studied here, anatomical descriptions are given for the family and four of its five tribes. The evidence indicates that the tribes Vivianieae and Wendtieae are very closely related. The Geranieae is distinct from these although Monsonia has characteristics intermediate between the Geranieae and the other two tribes mentioned. Biebersteinieae is quite dissimilar to the others and is considered to be the least closely related. The section Neurophyllodes of the genus Geranium is a closely related, natural group.

The developmental study of the primary tissues of Pelargonium domesticum revealed the early formation of leaf trace procambium and residual meristem. The residual meristem differentiates into parenchyma and procambium and, together with the three procambial strands per leaf, forms an essentially continuous provascular cylinder within the terminal half millimeter.

The so-called "pericycle" fibers are actually primary phloem fibers. Most of these are septate, each "compartment" containing a uninucleate protoplast. A preliminary anatomical survey of thirty-two species representing ten of the family's eleven genera showed the much cited "continuous ring of fibers" to be frequently interrupted and, in representative species of five genera, absent altogether.

Anatomical characters of the Geraniaceae have their greatest taxonomic value on the tribal level. This is especially true of qualitative ones. Quantitative characters appear to have greater potential value on the generic and specific levels. However, the quantitative characters described in this study may not be considered diagnostic because it has not been possible to determine their inherent variability. Microfilm \$2.50; Xerox \$8.80. 192 pages.

SOME POSTGLACIAL FORESTS IN CENTRAL AND EASTERN NEW YORK STATE AS DETERMINED BY THE METHOD OF POLLEN ANALYSIS

(L. C. Card No. Mic 58-7213)

Donald David Cox, Ph.D. Syracuse University, 1958

Supervisor: Mildred E. Faust

Fourteen pollen profiles from twelve stations in New York State are presented and discussed. These stations extend from Albany to Auburn in an east-west direction and from Ogdensburg to Oneonta in north-south range. Ten stations are south of latitude 43°30' North, and two are north of this parallel.

The southerly stations have profiles which are similar in general outlines, but differ in important details from those in other parts of eastern North America which have been described by Deevey, Potzger, Sears, and others. Most of the profiles begin with a coniferous period in which pine, spruce, and fir maxima occur successively. This is followed by a short, but prominent, pine period. The interval of pine dominance is replaced by a hemlock-hard-woods interval extending to the surface, characterized by two Tsuga maxima separated by a Tsuga minimum. A

Fagus maximum corresponds with the <u>Tsuga</u> decline, suggesting relative drying caused by an increase in temperature. The second <u>Tsuga</u> rise is associated with a reentrance of Picea to the profile.

Pine pollen size-frequency curves were constructed for eight of the stations. These suggest that Pinus banksiana was replaced in the pine period by P. strobus and/or P. resinosa, which continue to the present.

The northern diagrams correspond closely with those described by Potzger for Quebec. They show a prominent pine period followed by a long era of pine, hemlock, and deciduous genera. The top levels are identified by an increase in spruce and fir.

Samples were taken from the site where a mastodon skeleton was found. It was concluded that the animal lived during a time when the forest was dominated by spruce and pine. Microfilm \$2.00; Xerox \$6.80. 144 pages.

MORPHOLOGY AND SYSTEMATIC ANATOMY OF EMPETRACEAE

(L. C. Card No. Mic 58-5954)

Robert Stanley Leisner, Ph.D. The University of North Carolina, 1958

Supervisor: J. E. Adams

The three genera of Empetraceae, <u>Ceratiola</u> with 1 species, <u>Corema</u> with 2 species, and <u>Empetrum</u> with 8 species were investigated for data concerning internal anatomy, gross morphology, and floral morphology.

Evidence from anatomical investigations indicate that Ceratiola is the most primitive genus, Corema intermediate, and Empetrum the most advanced genus of the family.

Evidence from other workers involving pollen studies, embryology, cytology, floral structure, leaf formation, and external morphology together with the data obtained from the present study support the contention of Empetraceae being a member of Ericaceae.

It is proposed to reduce Empetraceae to subfamilial status with the name Empetroideae. The position of the subfamily in the Ericaceae is above Arbutoideae and below Ericoideae.

Two tribes are proposed for the Empetroideae using the names proposed by Pax: Coremateae containing <u>Corema</u> with terminal flowers and Empetreae containing <u>Ceratiola</u> and Empetrum with axillary flowers.

The Empetroideae is believed to have arisen in southern Asia and migrated northward and westward to Europe and thence to North America. Empetrum rubrum in southern South America is still a migratory problem.

Microfilm \$2.00; Xerox \$4.40. 83 pages.

THE FLUORESCENCE OF CHLOROPLASTS AND CHLORELLA IN RELATION TO THEIR PHOTOCHEMICAL ACTIVITY

(L. C. Card No. Mic 58-7950)

Berger Clinton Mayne, Ph.D. University of Utah, 1958

Chairman: John D. Spikes

The objective of this investigation was to measure and determine the relation between fluorescence yield and the photochemical activity of chloroplasts and <u>Chlorella</u> under a wide range of conditions.

The fluorescence of chloroplasts was found to decrease as the temperature was increased. The experimental energy of activation was found to be -2.3 kcal. per mole. The thermal inactivation of chloroplasts, as measured by their loss of Hill reaction activity, generally caused a decrease in the fluorescence of the chloroplasts; in some preparations, however, thermal inactivation had no effect on fluorescence. Ethyl carbamate accelerated the thermal decay of the fluorescence of chloroplasts.

The hydrogen ion concentration affected fluorescence in a complicated manner. The fluorescence passed through a maximum at a pH of approximately 5.5. At higher and lower pH values, the fluorescence was minimal at pH 5 and pH 8.

The fluorescence yield (fluorescence divided by light intensity) was found to be a function of light intensity. As the light intensity approached zero, the yield approached a lower limit larger than zero. As the light intensity was increased, the fluorescence yield increased until the yield approached an upper limit.

Ferricyanide (a Hill reaction oxidant) caused a decrease in the fluorescence yield of chloroplasts in the mid-range of light intensity but had no effect on the yield at low light intensity until the concentration of ferricyanide was high enough to absorb an appreciable fraction of the incident light.

The following theoretical equation, which fits the data, was derived on the assumption that fluorescence is a constant fraction of the absorbed light not utilized by the Hill reaction:

$$O = k_f (1 - \frac{k_D e}{1 + \frac{k_D}{k_I}})$$

where Φ is the fluorescence yield, k_f is the fraction of the light not utilized which is given off as fluorescence, I is the light intensity, α is the fraction of the light absorbed, k_D e is the maximum rate of utilization of the light at high light intensity, and $\frac{k_D}{k_L}$ is the light intensity at which the rate of the Hill reaction is one-half of its maximum value.

A very potent inhibitor of the photochemical part of the Hill reaction, 3-(3,4-dichlorophenyl)-1,1-dimethylurea (DCMU), increased the fluorescence at low light intensities as would be predicted from the equation.

A number of inhibitors of photosynthesis increased the fluorescence of Chlorella in the same concentration range in which they inhibit photosynthesis. The substituted ureas, 3-(4-chlorophenyl)-1,1-dimethylurea (CMU) and DCMU, increased fluorescence and decreased the magnitude of the changes which occur in the period immediately following

the beginning of illumination (induction period). This effect was reversible, as was the inhibition of photosynthesis. Ethyl phenyl carbamate increased the fluorescence of Chlorella without affecting the induction changes. Hydroxylamine increased the steady state fluorescence of Chlorella without increasing the first fluorescence peak of the induction period.

Quinone (a Hill reaction oxidant) caused a decrease in the fluorescence of Chlorella much the same as the reduction of chloroplast fluorescence by ferricyanide or quinone.

Ionizing radiation (Cobalt-60 gamma rays) decreased the induction fluorescence changes of <u>Chlorella</u> and sugar beet leaves and eliminated them at the highest irradiation dosage.

The results of these investigations on the fluorescence of chloroplasts were found to be compatible with reaction schemes derived previously for the Hill reaction if one makes the assumption that the fluorescence is a constant fraction of the light not utilized by the Hill reaction.

Microfilm \$2.00; Xerox \$5.00. 97 pages.

A MONOGRAPH OF THE GENUS HYDRANGEA

(L. C. Card No. Mic 58-1430)

Elizabeth May McClintock, Ph.D. University of Michigan, 1956

The purpose of this study is to present a world monograph of Hydrangea (Saxifragaceae: Hydrangeoideae, or Hydrangeaceae), a genus of woody plants which occurs in eastern North America, Central and South America, and eastern Asia. Previous treatments of this genus have either been regional or based on only a part of the genus. The key published by Engler in Die Natürlichen Pflanzenfamilien in 1930, while covering the entire genus, was a compilation of the usually accepted names and was not a critical study.

The procedure followed was to examine the collections of this genus deposited in the herbaria of the United States and Europe. The field work was limited to collecting in the southern Appalachian Mountains. From this was ascertained, first, the pattern of morphological variation within the genus, second, the morphological characters delimiting the species, third, the variation within the species, and fourth, their geographical distribution. Following this a critical examination of the type specimens and of the literature pertaining to them was made, in order to determine the valid names for the taxa.

The results of this study, presented in the systematic treatment, showed the genus to consist of twenty-three species which are placed in two sections, Euhydrangea which occurs in the temperate regions of eastern Asia and eastern North America, and Cornidia which occurs in the tropical regions of Central and South America. For each species there is given a description, a list of synonyms together with the place of publication of these names and the type specimens on which they were based.

Morphological variation within the genus as a whole is not great. The species are distinguished from one another by small differences in floral structures and certain leaf characters. The reduction to synonymy of the species based on variable and overlapping characters, such as leaf size and pubescence, has resulted in a small number of species most of which have a wide geographical distribution, rather than a large number of local species.

Since the genus is found in both the Old and the New Worlds the historical factors which are considered responsible for this disjunct distribution are presented. Fossil records of Hydrangea found in western North America and Shantung Province in China suggest that the genus had a wider distribution in the early and middle Tertiary than it has today, and that both sections existed during this time in western North America. Climatic changes during the early Tertiary resulted in the elimination of a Neotropical flora, containing what appears to have been a counterpart of the section Cornidia, from the Pacific Northwest. Further climatic changes during the middle Tertiary caused the elimination of a temperate mesophytic flora, the Arcto-Tertiary flora, which contained a number of fossil specimens belonging to the section Euhydrangea, from the Pacific Northwest by the end of the Miocene. It may be concluded that Hydrangea has existed in mesophytic temperate and neotropical floras during the Tertiary and into the present time and has shifted its distribution with the climatic changes which have caused the floras of which it was a member to shift their geographical ranges. Although its distribution is not as extensive today as it was in early and middle Tertiary times it may be assumed that it exists today under conditions not different from those of Tertiary times. Microfilm \$3.40; Xerox \$11.60. 262 pages.

TRANSMISSION AND LATENCY OF CHERRY NECROTIC RING SPOT VIRUS IN PRUNUS TOMENTOSA

(L. C. Card No. Mic 58-7566)

Glenn Walter Peterson, Ph.D. Iowa State College, 1958

Supervisor: W. F. Buchholtz

The previously reported low incidence of spread of necrotic ring spot (NRS) virus in sour cherry blocks in southwest Iowa nurseries suggested a possible mechanical transmission. Experiments designed to examine this possibility involved determining time inoculum must be left in contact with cherry trees if symptoms are to develop. Prunus tomentosa seedlings were inoculated when dormant, at bud break, and when buds were open with dormant buds, open buds, and dormant bark of infected Fruitmorency trees.

Inoculum was left in contact with the trees for 1, 2, 4, 8, and 42 days in one experiment and 2, 3, 4, 6, and 8 days in another. Symptoms did not develop under any of the conditions if inoculum was removed within three days. Contact periods of more than four days were required for transmission of NRS virus to P. tomentosa seedlings inoculated at bud break with dormant P. tomentosa buds and to Gilbert Montmorency trees inoculated at bud break with dormant Fruitmorency buds.

Transmission of NRS virus from infected to healthy P. tomentosa seedlings was investigated by placing uninjured roots, injured roots and grafted roots in contact for six weeks. Examination of thirty plant pairs revealed two cases of transmission (root grafts). Transmission occurred in two of 70 cases in similar experiments involving contact of injured and uninjured stems.

Transmission of NRS virus to P. tomentosa seedlings by placing infected leaf tissue under bark flaps occurred in three of 50 cases. Crude sap from Fruitmorency leaves containing NRS virus was absorbed in cotton and placed under bark flaps of P. tomentosa. Transmission was obtained in all of 20 trials. Similar attempts using sap free of leaf tissue and crude sap from Gilbert Montmorency leaves were unsuccessful. The transmission experiments were not suggestive of mechanical transmission with the possible exception of the experiment with crude sap. However transmission from crude sap could not be considered as mechanical since compatible leaf tissue was present.

That NRS virus can exist in a latent condition in P. tomentosa was demonstrated by inoculating ten seedlings with each of 18 sources of NRS virus and one year later reinoculating six of the ten, two with the same source, two with a similar source, and two with a dissimilar source. Symptom observations showed that many plants with or without reinoculation did not express symptoms the second time and that on those which did, symptoms were mild.

To determine effectiveness of previous indexing with P. tomentosa a scion orchard containing 250 trees which had been indexed repeatedly on P. tomentosa was indexed on Shirofugen. Only one NRS virus positive plant was detected.

P. tomentosa seedlings previously used for indexing and showing negative reactions were tested for possible reuse in indexing. Seedlings were cut back and completely defoliated, then inoculated with each of 18 sources of NRS virus. All inoculated seedlings expressed typical symptoms.

To test a new method for field indexing P. tomentosa seedlings were inoculated with NRS virus sources in winter, then returned to cold storage and set in the field in spring. All inoculated plants expressed symptoms.

Microfilm \$2.00; Xerox \$4.00. 75 pages.

CHEMISTRY

CHEMISTRY, GENERAL

THE DETECTION AND DETERMINATION OF ESTERS

(L. C. Card No. Mic 58-7342)

Mohd. Mohsin. Qureshi, Ph.D. Louisiana State University, 1958

Supervisor: Professor Philip W. West

An enzymatic method for the detection of esters has been developed. The use of various esterases as an analytical tool has been examined. It has been found that lipase can be used for the detection of esters under specified conditions.

Ion exchange resins have been utilized for the quantitative determination of esters in microgram quantities. The method gives satisfactory results in the analysis of dilute solutions.

It has been found possible to titrate solutions of molybdate and tungstate as dilute as 0.00025M by the use of high frequency titrations employing solutions of lead salts as the titrant. Microfilm \$2.65; Xerox \$9.20. 204 pages.

> A COMPARISON OF TWO METHODS OF TEACHING CERTAIN QUANTITATIVE PRINCIPLES OF GENERAL CHEMISTRY AT THE COLLEGE LEVEL

> > (L. C. Card No. Mic 58-5925)

Ulysses Simpson Stubbs, Jr., Ph.D. New York University, 1958

Chairman: Professor Elwood J. Winters

Statement of Problem:

American educators for over a half century have devoted considerable attention to the problem of methodology. Their aim has been (1) to increase the amount of learning on the part of students; (2) to develop ability in students to think critically; and (3) to promote student ability to comprehend relationships between phenomena. As a result of their pioneering activities, these educators have developed a number of new and effective methods of instruction which have been applied in elementary and secondary school teaching. Relatively few of these new methods found acceptance on the college level.

This study involved an experiment to compare the effectiveness of two different methods of teaching certain quantitative principles of general chemistry at the college level. The relative effectiveness of the inductive and the deductive methods was investigated in the following areas: (1) knowledge of important terms, concepts, and proper-

ties of chemical elements and their compounds; (2) skill in the quantitative application of chemical laws and principles; (3) comprehension and application of scientific method, procedure, and theory and their implications.

Method:

Two groups of freshman students enrolled in a one-semester general chemistry course were selected. Both groups were taught by the same instructor. They received the same amount of instruction: three one-hour lectures and two two-hour laboratory periods per week. The same subject-matter was taught; and the same teaching aids were used. The laboratory exercises were conducted in identical manner. The same pre-test and the same post-test were administered to both groups.

The courses dealt with certain quantitative principles of general chemistry including skills in balancing equations, gas laws, applications of molecular weights, atomic weights, and valence, the quantitative aspects of electrolysis, normality and molarity of solutions. Furthermore, certain aspects of scientific method were tested by the investigator during this experiment.

In order to obtain an objective measure of the relative effectiveness of both methods Parts 1, 3, and 4 of Form Y 1948 of the American Chemical Society Cooperative General Chemistry Test were administered as a pre-test. The results of this pre-test were compared with the results of a post-test that was administered after the conclusion of the experiment. This consisted of Parts 1, 3, and 4 of Form Z 1950 (equivalent to Form Y 1948 used in the pre-test) of the A C S.

Conclusion:

The conclusion drawn from the experiment points to the inductive method as being more effective than the deductive method as a means of teaching important terms, acquaintance with fundamental concepts, and general knowledge of the physical and chemical properties of common elements and their compounds. The inductive method also proved to be more fruitful than the deductive method for the training of students in the skillful use of scientific method and procedure as well as in critical thinking along scientific and logical lines.

On the other hand, no significant difference was found to exist between both groups in those areas which require merely mechanical application of formulas and laws such as skill in balancing equations, gas laws, computation and application of molecular weights, atomic weights, and valence as well as the quantitative aspects of electrolysis, normality and molarity.

The inductive method was found to be more effective than the deductive method in those areas which require a broad understanding of scientific method, procedure, and terminology, whereas it is equally as effective as the deductive method in areas which are concerned with more mechanical and computative aspects of chemistry at the college level. Microfilm \$2.00; Xerox \$7.20. 151 pages.

CHEMISTRY, BIOLOGICAL

THE BIOSYNTHESIS OF CHOLESTEROL IN ISOLATED RAT LIVER CELLS

(L. C. Card No. Mic 58-7960)

Henry John Albers, Ph.D. Purdue University, 1958

Major Professor: Ralph C. Corley

The cholesterol level of the wet livers of rats maintained for 23 days on a pantothenic acid deficient diet was 27% lower than that of controls. There were increases of 23% and 61% respectively after supplementing the deficient diets with β , β -dimethylacrylic acid and squalene. These results are consistent with the view that pantothenic acid and therefore presumably coenzyme A is not required in the processes of synthesis of cholesterol beyond the formation of β -hydroxy- β -methylglutaric acid.

The effect of PbCl₂ on the incorporation of acetate-1-C¹⁴ into cholesterol in liver slices was studied when added to a Krebs-Ringer phosphate buffer, a phosphate-free Krebs-Ringer solution, Locke's solution or Sörensen glycine buffer or after perfusion of the livers with PbCl₂-saturated Locke's solution or after feeding PbCl₂ to the rats. No significant effects of PbCl₂ were observed. In contrast, HgCl₂ and CdCl₂ depressed the incorporation nearly 100%.

With 100 as the value for the control, incorporation of acetate-1-C¹⁴ into cholesterol in the presence of these metal chlorides (10⁻³ M) was: ZnCl₂, 44; NiCl₂, 65; CuCl₂, 42; SnCl₂, 48; CoCl₂, 76; CrCl₂, 55. In the absence and presence respectively of coenzyme A (10⁻⁴ M), incorporation in the presence of halogenated acetates (10⁻⁴ M) was: Cl-acetate, 96, 76; Br-acetate, 85, 62; F-acetate, 51, 100. The inhibitory action of Cl-acetate and Br-acetate may be related to their ability to form thioether derivatives with proteins or coenzyme A. With F-acetate the formation of a fluoroacetyl coenzyme A derivative is suggested. Thus, after extended feeding of fluoroacetate to rats cholesterol containing 0.41% fluorine was isolated from the liver.

Whole cell suspensions obtained by screening have been reported to be incapable of synthesizing cholesterol. Changes in permeability or loss of essential factor(s) may be responsible.

Unwashed whole cell preparations of rat livers did not incorporate the label of acetate- $1-C^{14}$ and β,β -dimethylacrylate- $1-C^{14}$ into cholesterol, but did yield labelled fatty acids and CO_2 . Washing the whole cells with potassium phosphate buffer led further to an essential lack of labelling of the fatty acids and a striking reduction in the radioactivity of the CO_2 produced. The washed cells treated with a $20,000 \times g$ supernatant, (obtained from the unwashed whole cell preparation) inactive alone, showed ability to synthesize cholesterol. Addition of cofactors required for cholesterolgenesis in homogenate preparations had no effect.

Homogenates prepared from washed whole cell suspensions did not incorporate acetate-1- C^{14} into cholesterol, but did so into long-chain fatty acids and $^{14}CO_2$ as readily as homogenates from whole tissue. However, homogenates from washed cells in the presence of a 20,000 x g or 101,000 x g (average) supernatant (obtained from unwashed

whole cell suspension) were capable of incorporating radioacetate into cholesterol. Heating (80°C, 5 min.) these supernatants usually rendered them incapable of supplementing the cells.

If the inability of washed whole cell suspensions to incorporate acetate-1-C¹⁴ into cholesterol could be explained solely on the basis of permeability, an active homogenate preparation capable of incorporating acetate-1-C¹⁴ into cholesterol without further requirement would have been expected. However, the loss of an obligatory, heat labile, cofactor(s) for the biogenesis of cholesterol from washed cell suspensions of rat liver has been obtained.

Microfilm \$2.05; Xerox \$7.40. 156 pages.

1909

ALKALINE DEGRADATION OF PERIODATE-OXIDIZED STARCH, XYLAN AND DEXTRAN

(L. C. Card No. Mic 58-7966)

Perkins Peng Keng Chang, Ph.D. Purdue University, 1958

Major Professor: Dr. Roy L. Whistler

Periodate-oxidized corn starch (100% oxidized) is subjected to alkaline degradation in four different treatments: (a) a short-term treatment (30 minutes) with oxygen-free N sodium hydroxide, (b) a long-term treatment (5 months) with oxygen-free N sodium hydroxide, (c) a short-term treatment (30 minutes) with oxygen-free saturated lime water, (d) a long-term treatment (40 days) with oxygen free saturated lime water. The degradation products are first separated into neutral and acidic fractions by means of appropriate ion-exchange resins. The acidic fraction is studied in more detail. Total acidity and the percentage of volatile acids produced by the various treatments are determined by titration. The non-volatile acids are isolated as individual components by means of quantitative paper chromatography. Spectrophotometric methods are used for the determination of glycolic acid and 2,4-dihydroxybutyric acid and its lactone. Glycolic acid is identified as its amide and also as its 4-bromophenacyl ester; 2,4dihydroxybutyric acid is characterized as its anilide and as its brucine salt. In each of the four treatments, glycolic acid is the predominant acidic degradation product and 2, 4-dihydroxybutyric acid (and its lactone) is produced in the next largest amount.

Resinous acidic products and Cannizzaro rearrangement products are also obtained. Evidence for the presence of the latter is given by chromatographic identification of its acid hydrolysis products and by the actual isolation and identification of erythritol.

A short-term (30 minutes) degradation in oxygen-free N sodium hydroxide is also done with 70% periodate-oxidized xylan (from corn cobs) and with 100% periodate-oxidized dextran (from L. mesenteroides). Glycolic acid and lactic acid are isolated and identified as the first and second major acidic degradation products, respectively, in each case.

It is concluded that the qualitative results of the alkaline degradation of periodate oxystarch and also of the periodate-oxidized xylan and dextran corroborate the

hypothesis of the <u>beta-alkoxy-carbonyl</u> elimination mechanism. However, the lower than theoretical yield of both acids and the high ratio of glycolic acid to either 2,4-dihydroxybutyric acid or lactic acid do not meet the conditions required by the proposed mechanism. It is, therefore, suggested that the alkaline degradation of periodate oxypolysaccharides is not entirely due to this elimination. A competing reaction, such as the ketene acetal hydrolysis suggested by Pascu, might occur concurrently with the beta-alkoxy-carbonyl elimination.

Microfilm \$2.00; Xerox \$3.60. 64 pages.

IN VIVO AND IN VITRO STUDIES ON THE FORMATION OF PROTEIN-BOUND DERIVATIVES OF AMINOAZO DYES BY RAT LIVER

(L. C. Card No. Mic 59-708)

Harry Victor Gelboin, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor James A. Miller

One of the metabolic reactions which precedes hepatic tumor formation when the aminoazo dyes related to 4-dimethylaminoazobenzene are fed to rats is the formation of protein-bound derivatives of the dyes in the liver. A number of correlations between the level of protein-bound dye and the expected tumor incidence under a variety of conditions have indicated that the formation of protein-bound dye may be of causal importance in this carcinogenic process. In the above studies the dyes were fed in the diet for periods of one week to several months at carcinogenic levels (4-6 mg/day).

This study shows that protein-bound dye is found in the liver within a few hours after the intraperitoneal injection of 50 mg. of dye. This protein-bound dye was similar to that formed with continuous feeding with respect to its specificity for the liver, absence from the induced liver tumor, intracellular distribution in the liver, half-life, and the spectral and solubility properties of the dyes released by alkaline hydrolysis.

Three lines of evidence indicated that the dye is bound under these conditions to certain liver proteins during their synthesis rather than to pre-existing protein. Thus, 5-10 hours after dye administration the proteins of the microsomes, a primary site for protein synthesis in the cell, had higher concentrations of bound dye than the other cell fractions. Further, the administration of amino acid analogs prior to the dye inhibited the formation of proteinbound dye. Ethionine decreased the amount formed in 24 hours by 60-70% and the inhibition was prevented by methionine. In other experiments rats were fed a proteinfree diet for 8 days and then fed a 50% casein diet to replenish the protein stores in the liver. At various intervals the ability to bind dye was tested and was found to correlate with the increased rate of protein synthesis during the first 2 days on the high protein diet and the return to normal rates during the subsequent period.

The second part of this work shows that rat liver slices, homogenates, and either isolated mitochondria or microsomes enzymatically form a type of protein-bound dye when properly fortified and incubated aerobically with

3'-methyl-4-monomethylaminoazobenzene or 3'-methyl-4-aminoazobenzene. The amount of protein-bound dye formed was 3-6 times greater when the rats were injected 18-24 hours previously with 1 mg. of benzpyrene. The increased activity appears to be due to an increase in the amount of enzyme. Ethionine completely prevented the stimulatory response and this prevention was reversed by methionine. The binding reaction in homogenates proceeds optimally at pH 8.2 and linearly with time up to one hour and with dye concentration up to 2 μ M per flask. The homogenate system requires nicotinamide and diphosphopyridine nucleotide for maximal activity and the latter is partially replaceable by triphosphopyridine nucleotide. In isolated mitochondria and microsomes the reduced forms of the pyridine nucleotides are required. Tests on the incorporation of amino acids into protein in the in vitro system indicated that the dye binding reaction was independent of these processes.

The protein-bound dye formed in vitro differed from that formed in vivo in its absorption spectrum, in the polarity of the dye released upon alkaline hydrolysis and in the greater amounts of dye released by treatment with trichloroacetic acid and alkali from the protein-bound dye formed in vitro. Forty per cent of the dye released by alkaline hydrolysis from protein-bound dye formed in vitro was characterized as 3'-methyl-4-aminoazobenzene. In view of these differences further data are needed for the elucidation of the relationship of the in vitro binding to the carcinogenic process and to the protein-bound dye formed in vivo.

Microfilm \$2.00; Xerox \$6.40. 132 pages.

KINETIC STUDIES OF METABOLIC INTERACTIONS AMONG MONO- AND POLYNUCLEOTIDES OF MOUSE LIVER

(L. C. Card No. Mic 58-7399)

Ernest David Gray, Ph.D. University of Minnesota, 1958

Normal mice 5 to 6 weeks old were sacrificed at varying time intervals after the intraperitoneal injection of P³². The livers were removed, homogenized, and fractionated ultracentrifugally into nuclei, microsomes, ultramicrosomes and a supernatant fraction. Specific activity of the AMP from the RNA of these fractions was determined. The acid-soluble AMP and ADP of the whole tissue were isolated by ion exchange chromatography and the specific activities of AMP, the stable phosphorus and the labile phosphorus of ADP measured. Acid-soluble AMP was examined for the presence of deoxy-AMP but none was found.

The specific activity-time curves of AMP and the stable phosphorus of ADP (ADPS) followed similar courses during the 2 hour period of the experiment. The labile phosphorus of ADP was markedly different in specific activity from ADPS, following a time course similar to that observed by others for inorganic phosphorus. ADPS and AMP reached their maxima in specific activity at about $1\frac{1}{2}$ hours after P^{32} injection.

The various cellular fractions obtainable upon differential centrifugation of an homogenate exhibited distinct differences in specific activities at all time intervals measured (N > S > U > M). At the end of 2 hours, the

cytoplasmic RNA-AMP specific activities were still rising while the nuclear RNA-AMP appeared to have reached a maximum. The level of specific activity of NRNA-AMP was considerably lower than that found for total NRNA-P in previous studies. The possible explanations for this were discussed.

Various schemes of metabolic interrelations were examined mathematically from calculations performed on the specific activity-time curves of the isolated AMPs and ADPS. A scheme in which ADPS served as precursor to SRNA-AMP and this in turn as precursor to U and MRNA-AMP seemed best to fit the available data. This is consonant with a similar interrelationship suggested elsewhere.

It was not possible to fit NRNA-AMP into any scheme tried. The reasons for this are not apparent in this study; but in the light of other reports, this seems to be due to the heterogeneity of NRNA. The NRNA isolated in the present study is possibly a mixture of two or more NRNAs with different metabolic activities.

The similarity in the time courses of acid-soluble ADPS and AMP prevent the designation of either one as the proximal precursor of RNA-AMP. Other evidence and energetic considerations would favor ADPS yet this cannot be settled by the present experiments. It seems reasonable to conclude that a kinetic study conducted in vivo cannot differentiate between these two compounds as precursor.

Microfilm \$2.00; Xerox \$4.60. 90 pages.

STUDIES OF THE ROLE OF ACID PHOSPHATASE IN METABOLIC PROCESSES

(L. C. Card No. Mic 58-7980)

Grace Sewell Kilsheimer, Ph.D. Purdue University, 1958

Major Professor: Bernard Axelrod

Although non-specific acid phosphatases have been studied extensively in isolated systems, their function in the living organism remains in doubt. With a specific phosphatase inhibitor such as (+)-tartaric acid, it should be possible to gain an insight into the role of phosphatase in the organism. Liver mitochondria, which possess a well organized system of enzymes whose function is concerned with phosphorylated compounds do, indeed, possess a nonspecific acid phosphatase which is inhibited by (+)-tartaric acid. Thus the mitochondria provide an excellent organelle for studying the action of phosphatase. Unfortunately, however, it has been reported that the tartrates have but little effect on α -ketoglutarate oxidation in rat liver mitochondria. This could, perhaps be due to poor permeability or poor access to the active site because of ionization in the media external to the mitochondria. Since the diethyl ester of (+)-tartaric acid, which is not ionizable, has also been found to inhibit non-specific acid phosphatase, it was tested in the mitochondrial system. It was found that diethyl (+)tartrate inhibits the oxidation of α -ketoglutaric acid, fumaric acid, pyruvic acid, succinic acid, citric acid and glutamic acid by rat liver mitochondria. α -Ketoglutarate oxidation, fumarate oxidation, pyruvate oxidation and glutamate oxidation are all completely inhibited within 30 to 60 minutes whereas succinate oxidation is inhibited

more slowly and citrate oxidation is never completely inhibited.

The question still remained as to which portion of the respiratory chain was affected by the inhibitor. The succinoxidase, succinic dehydrogenase and cytochrome oxidase systems were investigated. It was found that the succinoxidase and succinic dehydrogenase systems of rat liver mitochondria are inhibited by diethyl (+)-tartrate whereas the cytochrome oxidase system is not. The DPNH to oxygen span was also investigated using β -hydroxybutyric acid as substrate. This system is inhibited by diethyl (+)-tartrate. P:O ratios were determined to see whether a differential effect on respiration and phosphate uptake occurs. P:O ratios in the β -hydroxybutyrate system are not affected by the inhibition. When the oxidation of β -hydroxybutyrate is uncoupled from phosphorylation with 2,4-dinitrophenol, the inhibition by diethyl (+)-tartrate is still observed. This indicates that the action of the inhibitor is on oxidation and is not dependent on coupled phosphorylation.

Since (-)-tartaric acid does not inhibit phosphatase whereas (+)-tartaric acid does, the esters of both (-)- and (+)-tartrate were tested in the β -hydroxybutyrate system. It was found that the dimethyl esters of both isomers inhibit oxidation equally well showing that the inhibition is non-specific with respect to the enantiomorphic form. The modes of action of the two isomers may differ, however.

Diethyl (+)-tartrate was also tested as an inhibitor of oxidations in digitonin extracts of rat liver mitochondria and was found to have no effect. This may be due to the absence of esterase activity in the preparations, since it was found that diethyl (+)-tartrate becomes a less effective inhibitor as rat liver mitochondria are washed free of contaminating microsomal esterase.

Since (+)-tartaric acid inhibits non-specific acid phosphatase from animal, but not from plant, tissues, diethyl (+)-tartrate was tested as an inhibitor of α -ketoglutarate oxidation by castor bean mitochondria and subcellular particles from cabbage. It was found to have only a slight inhibitory effect in both cases.

A number of organisms from protozoa to higher plants and animals have been studied to determine whether some of the protists also contain a (+)-tartrate-inhibitable phosphatase. The enzyme has been found to be present in all the animal species studied, in protozoa, in higher fungi, and in some species of lower fungi. The inhibitable enzyme is observed in the euglenids but not in the chlamydomonads. None of the higher plants studied exhibit the enzyme, nor do bacteria, yeasts, and some lower fungi. Thus the presence or absence of (+)-tartrate-inhibitable phosphatase may have some value in determining relationships among some of the controversial microorganisms.

The non-specific acid phosphatases associated with both the mitochondria and microsomes of rat liver have also been studied. Microfilm \$2.00; Xerox \$5.60. 111 pages.

IMMEDIATE EFFECTS OF INSULIN ON GLUCOSE UTILIZATION IN NORMAL RATS

(L. C. Card No. Mic 59-642)

Herman W. Levin, Ph.D. Temple University, 1958

Experiments were designed to study the early effects of insulin administration on glucose oxidation, and on its conversion to liver and muscle glycogen in fasted, glucosefed, and post-absorptive rats using an isotopic labeling procedure. By labeling the blood glucose, many of the limitations of balance studies are avoided. The translocation of glucose into tissues, and its conversion to metabolic products can be followed with ease, even though the quantities transformed are too small to be detected by the normal quantitative analytical methods. In the present study fasted rats were given either one millimole or a trace dose of uniformly-C¹⁴-labeled glucose, with and without the simultaneous intraperitoneal administration of glucagon-free insulin (20 U/kg.). Respiratory CO2 was collected at 10 or 15 minute intervals during the first 2 hours of the experiment, and subsequently at longer intervals. In the animals receiving the large dose of glucose, the rate of CO2 excretion was not significantly different for the insulinized (11.3) mM carbon/hr.) and the control (12.5 mM carbon/hr.). At the peak in the curve of specific activity versus time, the specific activity of the respiratory CO2 from the insulinized rat, was 50 per cent higher than that of the control rat. The animals which received a trace dose of glucose-C1 exhibited both an increased metabolic rate and a more rapid rate of conversion of blood glucose to CO2. On an average, the insulinized animals excreted 11.5 mM of carbon/hr., and the control animals excreted 8.43 mM of carbon/hr. The maximum in the specific activity versus time curve occurred between 15 and 30 minutes for the insulin treated animals and between 45 and 90 minutes for the control animals. This observation indicated that insulin had opened a pathway for the more rapid conversion of glucose to respiratory CO2.

In further studies on the immediate effect of insulin on glucose utilization, the rate of incorporation of a trace dose of uniformly-C¹⁴-labeled glucose into blood bicarbonate and tissue glycogen was studied. In all experiments of forty minutes duration or less, the insulinized animals exhibited a larger incorporation of glucose carbon into CO₂ than the untreated animals. The peak difference occurred at twenty minutes with the insulin treated animals having incorporated up to 6 per cent of the administered dose of glucose into the blood bicarbonate. The incorporation of radioactivity into the blood HCO₃ of the normal animals continued to increase while, after twenty minutes, the activity in the HCO₃ of the insulinized animals decreased continuously. By one hour the control animals exhibited a greater incorporation of glucose carbon in the blood bicarbonate.

The muscle glycogen of the insulinized animals showed a continuous increase in the incorporation of glucose into glycogen during the entire experimental period. Differences as large as 11-fold were observed in the incorporation of glucose carbon into glycogen in the muscle of the insulinized rat over the control. These effects of insulin on the incorporation of blood glucose into blood bicarbonate and muscle glycogen were evident as early as 5 minutes and are therefore coincident in time with the hypoglycemic action of the hormone.

Because of the low glycogen levels in the livers of the fasted animals, the data on the effect of insulin on the incorporation of blood glucose into liver glycogen is inconclusive. However, the data obtained with glucose-fed or post-absorptive animals clearly indicate that insulin does not accelerate liver glycogen formation and may depress it. An hypothesis is presented to account for the effects of insulin observed in the liver.

Microfilm \$2.00; Xerox \$6.00. 124 pages.

A BIOCHEMICAL STUDY OF ISOLATED BRAIN PARTICULATE PREPARATIONS OF YOUNG AND OLD RATS

(L. C. Card No. Mic 59-670)

Stanley Samuels, Ph.D. Syracuse University, 1958

Whole homogenate and mitochondria rich particulate preparations of brain have been compared metabolically and chemically, in paired, young-mature (6-7 month old) and senescent (24-27 month old), albino rats.

Oxygen consumption was measured in the Warburg apparatus, and inorganic phosphate utilization determined by a modification of the method of Berenblum and Chain, with particulate preparations isolated either in isotonic sucrose or the raffinose-dextran medium of Birbeck and Reid. Glutamate, pyruvate plus malate, and succinate were used as substrates. Oxygen consumption of whole homogenates was also measured with glucose as the substrate. Measurements of the brain fresh weight and whole brain or particulate nitrogen were made routinely; nitrogen was determined by a Kjeldahl digestion and Nesslerization of the ammonia distillate. Total particulate phosphorus was measured in a small series by oxidative digestion with sulfuric acid and 30% hydrogen peroxide, followed by determination of the inorganic phosphate.

Experimental findings were as follows: The rates of pyruvate plus malate and succinate oxidation were found to average 12% higher in the old animals. The pyruvate plus malate increase was statistically significant at the 2.5% level in 15 animal pairs, while the succinate data reflect the rather consistent finding in a smaller series of 6 experiments. No age difference was found in the rate of glutamate oxidation in 20 pairs of old and young animals. No age change was found in oxidative phosphorylation with any of the substrates. No difference was evident in the glucose utilization of brain homogenates of 8 pairs of old and young animals, either when expressed in terms of nitrogen content or the calculated dry weight. Data from 24 pairs of rats revealed no difference in the particulate nitrogen content per gram of fresh brain. In 5 experiments, no age change was evident in the total phosphorus content of the particles. Measurements of the total nitrogen content of whole homogenates from 8 animal pairs revealed a 6% decline with age, significant at a P value of 2.2%. No metabolic or age difference was evident between the sucrose and raffinose-dextran preparations.

In agreement with previous workers, it was found that the brain particulate preparations were unable to metabolize the 4, 6 and 8 carbon fatty acids. It was also found that γ -aminobutyrate was not actively metabolized by this preparation.

Although it has been previously reported that a brain particulate preparation can carry out aerobic glycolysis, as well as the Krebs' cycle oxidations and therefore degrade glucose completely, it was found that whole brain homogenates could not utilize glucose under conditions at which pyruvate (plus malate) was actively oxidized. In addition to ATP, which sufficed for the pyruvate and Krebs' cycle oxidations, DPN was essential for glucose metabolism, and the addition of nicotinamide and cytochrome c was of further benefit.

Microfilm \$2.00; Xerox \$6.20. 130 pages.

THE ROLE OF FLUORIDE IN THE MINERALIZATION OF CALCIFIABLE TISSUES

(L. C. Card No. Mic 58-5968)

George Hansford Spooner, Ph.D. The University of North Carolina, 1958

Supervisor: Michael K. Berkut

This investigation was concerned with certain biochemical phenomena occurring just prior to the deposition of mineral elements in developing bone and in the formation of enamel and dentin. The possible role of potassium in mechanisms associated with the mineralization of such hard tissue implicating phosphorylative glycolysis was considered. The influence of fluoride on potassium metabolism was investigated in the golden hamster. The minimal requirement of potassium for optimal growth of the hamster was also investigated and established.

Two colonies of hamsters were reared through several generations of inbreeding. During this period, one colony, designated as a non-fluoride history (NFH) colony, was given distilled water to drink. Animals of the other colony, called a fluoride history (FH) colony, received 50 micrograms per milliliter of fluoride as sodium fluoride in their drinking water. After 3 or 4 generations of inbreeding, animals from each colony were placed on purified diets. The dietary potassium levels were varied to contain adequate and inadequate amounts necessary for optimal growth. Hamsters from the NFH colony were then distributed between two additional experimental groups. Some of these animals continued on a distilled water regime while others were given drinking water containing 50 micrograms per milliliter of fluoride. Animals from the original FH colony were treated similarly. At the end of a six-week experimental period, the animals were killed. Determinations were made on bone for calcium, phosphorus, potassium, and percent ash. The dentin and enamel were separated and analyzed for their potassium content.

No gross differences in appearance were noted between the basic NFH and FH colony animals after 8 generations of inbreeding. Furthermore, during this period, no indication of fluorosis was noted in animals from the FH colony.

Significant differences between the weaning weights of the NFH and FH colony animals were noted. The average number of animals weaned per litter was the same for each colony during the generations tested. There were no differences in weaning weights of males and females within either colony.

The potassium requirement of the golden hamster for

maximal growth was found to be 0.18%. This value varied with the fluoride ingested. The minimal requirement for potassium was lowered when NFH animals were given 50 micrograms per milliliter of fluoride in their drinking water. Animals from the NFH colony on one of the submarginal levels of potassium actually attained a higher weight at the end of 6 weeks when fluoride was available. The ingestion of fluoride increased the number of animals from the NFH colony that survived the experimental period when the lowest dietary potassium levels were fed.

Non-fluoride treated animals from the FH colony, however, showed an increased requirement for potassium for maximal growth. In comparison with the NFH animals these hamsters receiving prolonged fluoride treatment when fed submarginal levels of dietary potassium had difficulty in surviving the experimental period.

Growth data obtained from the NFH control group showed that the requirement for potassium for optimal growth was highest during the first week of the experiment. This value then decreased and by the third week a dietary requirement for maximal growth was attained which remained constant for the duration of the experimental period

Bone ash determinations showed that the FH animals on fluoride treatment had a higher mineral content than did the controls. Any treatment with fluoride increased slightly the ash content of bone.

The calcium content of bone did not vary for any level of potassium tested nor was it influenced by fluoride treatment. There was a tendency for the phosphorus content of bone from animals on low dietary potassium to be decreased. This apparent decrease was not influenced by fluoride treatment. The potassium content of bone was lowest in animals which received a low potassium intake.

The potassium content of dentin and enamel was reported. The amount of potassium in enamel from male animals was considerably increased by ingestion of fluoride.

A rapid complexometric method for the determination of calcium in ashed bone was reported. Studies were made on the interference of phosphate, magnesium, and fluoride on calcium recoveries in these determinations.

Microfilm \$2.00; Xerox \$7.00. 150 pages.

CHEMISTRY, INORGANIC

STUDIES OF COMPLEXES OF COPPER(II)-o-AZOPHENOL WITH ETHANOLAMINE AND ETHYLENEDIAMINE

(L. C. Card No. Mic 59-665)

Elwood J. Gonzales, Ph.D. Tulane University, 1958

Chairman: Hans B. Jonassen

Investigations of the effect of increasing concentration of ethylenediamine (en) and ethanolamine (em) on the metallated dye complex, Cu(II)-o-azophenol (Cu(II)-dye), have disclosed information about the stereochemistry of the mixed ligand complex formed in each system.

A visible spectral study of each complex reaction was undertaken in which the Cu(II)-dye concentration was held constant and the amine concentration varied. The en system exhibits the presence of isobestic points at 404 and 515 millimicrons which are absent in the em system. A resulting shift toward the longer wavelength region occurs in the former being indicative of decreased molecular vibration and hence increased stability. Ethanolamine addition to the Cu(II)-dye does not show this shift even though 80 times the concentration of em is used.

The Cu(II)-dye-en complex may also be formed in solution by reacting (Cu en)⁺² and (Cu en₂)⁺² with dye or Na_2 dye and observing the visible spectra. Spectral and conductance titration data were used to confirm the 1:1 molar reaction ratios. Similar work utilizing (Cu em₂)⁺² and adding the dye or Na_2 dye resulted in identical visible spectra and the absence of any isobestic point in agreement with spectra obtained by addition of em to Cu(II)-dye. Spectrophotometric and conductance titrations also gave 1:1 molar reaction between (Cu em₂)⁺² and dye or Na_2 dye.

The postulation that the dye must displace en or em from the copper(II)-amine complexes by reaction with the coordinated nitrogens was proven by a study of the effect of en and em on the visible spectrum of the dye. Spectro-photometric and conductometric titrations of dye with each amine showed that one mole en reacted with one mole of dye but two moles of em were required. This is explainable since en has two reactive nitrogens and em only one available for combination with the dye's two acidic hydroxyl hydrogens.

Further evidence of the reaction between the dye and amines was obtained in titration of mixtures of en or em and dye, and of en or em and Na₂dye with copper(II) ion.

Evidently this behavior appears due to different structures of the amine complexes. Subsequent magnetic susceptibility measurements in solution confirm this.

Magnetic titration of Cu(II)-dye with increasing en and em were performed using the Gouy method, each solution having identical molarities of Cu(II)-dye and amine. The curves of weight change versus molarity of the amine ligands showed a maximum for the em titration with subsequent leveling off and a minimum in the en titration. A calculation of the susceptibility at the maximum gave a moment of 1.13 Bohr Magnetons whereas a similar calculation for the en minimum indicated 1.93 Bohr Magnetons.

The low moment indicates spin exchange between the unpaired electrons of Cu(II) ions caused by repulsion of the strong field of the OH groups of ethanolamine. Spin exchange in copper(II) compounds has been observed by Gilmore and Pink for copper laurate monohydrate and its monopyridine derivative and Bleaney observed the same phenomena for cupric acetate monohydrate. The water molecule in these hydrates is in the fifth position of a tetragonal pyramid.

A postulated structure for the solid in which the molecule is dimeric was found from molecular weight determinations on the solid. This structure which could be bridged by hydrogen bonds between em molecules was given further support by the infra-red spectrum of the solid ethanolamine complex which showed the presence of a broad bond in the 3 - 4.25 micron region. A tetragonal pyramid structure in which the OH group of em occupies the fifth position would allow close approach of Cu(II) ions and subsequent spin pairing as in solution. The dimer could then be hydrogen bonded through OH groups to another dimer.

The moment of the en complex 1.93 B. M. indicates an increase in paramagnetism (due to large orbital contribution) above 1.73 B. M. (that required for one unpaired electron by spin only). This may be explained by postulating a five coordinated complex in which both amino groups are coordinated to the Cu(II)-dye giving a 4s4p4d³ configuration which may be trigonal bipyramid or tetragonal pyramid.

Ray and Sen stated that copper(II) complexes having moments from 1.8 - 2.0 B. M. are "outer orbital" complexes with large orbital contribution to the moment. This provides evidence for our spd³ postulation.

Analysis of the solid ethylenediamine complex indicates a 1:1:1 mole ratio of Cu:dye:en in the solid in agreement with that postulated for the species in solution. The em complex also analyzed 1:1:1 Cu:dye:em. Of course, the analyses would be the same for the dimer.

Microfilm \$2.00; Xerox \$6.60. 137 pages.

STUDIES ON COORDINATION NUMBER EIGHT

(L. C. Card No. Mic 59-715)

Frederic Allan Johnson, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor E. M. Larsen

Compounds which have eight ligands about a central atom have been little studied. For certain classes of these compounds, optical and geometric isomers should exist in such numbers that simple physical and chemical methods may reasonably be expected to bring about separation of all of the isomers. Since a partial resolution of the tetraoxalato-uranate(IV) ion has been claimed, this work was undertaken in an effort to separate the isomers of this and related complexes of coordination number eight and to determine the configuration and bonding of the compounds by enumeration of the isomers.

The potassium tetraoxalato-metal complexes of uranium(IV), zirconium, hafnium, and thorium were prepared, and the conditions necessary for attaining the theoretical composition determined. Infrared, ultraviolet, and visible spectra of the compounds were obtained. The densities of the four tetraoxalates at 25° were: uranium(IV), 2.57 g./cc.; thorium, 2.48 g./cc.; zirconium, 2.18 g./cc.; and hafnium, 2.44 g./cc. The magnetic moment of the uranium(IV) salt in solution was found to be 2.3 Bohr magnetons.

The behavior of these 4:1 compounds during the process of solution and reprecipitation was investigated by analysis of the products. Loss of oxalate showed that the complexes were not inert. Other evidence supporting this conclusion is cited. An equilibrium exists in solution as represented by the equation:

 $2H_2O + M(C_2O_4)_4^{-4} = M(C_2O_4)_3(H_2O)(OH)^{-3} + HC_2O_4^{-1}$

Exchange experiments with C(14) labeled oxalate showed that the tetraoxalato-metal complexes are completely exchanged in 2 minutes at 25° and in 5 minutes at 5°. The exchange experiments were carried out for uranium(IV), zirconium and hafnium in solutions of various tetraoxalate, C(14) oxalate and inactive oxalate concentrations. Counting was done on solid tetraoxalate samples obtained by the precipitation of the complex salt with alcohol.

Repeat experiments of a claimed partial resolution of the tetraoxalato-uranate(IV) ion were performed, but no significant rotations were observed. The techniques of fractional crystallization and fractional precipitation were used with both quinine and strychnine. Attempts to resolve the tetraoxalate-zirconium ion were also unsuccessful.

Preliminary X-ray diffraction work indicated that the zirconium and hafnium compounds are monoclinic of space group $P_{2_1/a}$, with four formula weights per unit cell. The unit cell dimensions were found to be:

	"a"	"b"	"c"	"beta"
Hafnium	15.94	12.35	10.62	94°20'
Zirconium	16.10	12.34	10.23	approx. 940

The space group and the number of formula weights make it likely that the complex ions exist in the solid in non-superimposable forms, but no more than one form and its mirror image exist in the product obtained from aqueous solution. The results of the solution studies above made it unlikely that any measureable resolution can be achieved because of the lability of the complexes.

The powder patterns of the thorium and uranium(IV) compounds indicated that these two complexes are isomorphous. The salts seem to be monoclinic with the apparent dimensions:

	"d ₁₀₀ "	"d ₀₁₀ ,"	"d ₀₀₁ "	"beta"
Uranium	8.87	7.50	12.47	60° (approx.)
Thorium	9.08	7.56	12.56	60° (approx.)

Attempts to prepare inert coordination number eight complexes of molybdenum(IV) similar to the inert octacy-anides of molybdenum(IV) and tungsten(IV) were unsuccessful. Samples of octacyanides of molybdenum(IV) and tungsten(IV) were prepared and infrared spectra of the hydrated and anhydrous compounds determined by the potassium bromide disk method.

Attempts to resolve various non-ionic acetylacetonates of coordination number eight by adsorption techniques on quartz and D-lactose resulted in no significant rotations.

Microfilm \$2.75; Xerox \$9.60. 211 pages.

BARIUM-LITHIUM PHASE SYSTEM

(L. C. Card No. Mic 58-7223)

Douglas Vern Keller, Jr., Ph.D. Syracuse University, 1958

The barium-lithium phase system has been investigated in the liquid and solid state over the entire composition range. The liquidus and solidus temperatures were determined by thermal analysis techniques. A solid state X-ray investigation over the entire composition range indicated that only one compound existed, BaLi₄, melting incongruently at 156°C. A eutectic between this compound and lithium at 70 weight percent barium melts at 143°C. The solid solubility of barium in lithium was found to be less than 1 w/o barium and of lithium in barium less than 0.4 w/o lithium. The solid solubility of either component in the compound was immeasurably small.

Since single crystals of the compound could not be isolated, the determination of the cell parameters and the proposed crystal structure are based entirely upon powder data. The cell parameters of BaLi₄ which crystallizes in the hexagonal system were found to be:

$$a_o = 10.92 \pm 0.01 \text{ A.U.}$$
 $c_o = 8.94 \pm 0.01 \text{ A.U.}$
 $c/a = 0.818$

The density of the compound was 1.75 ±0.05 g./cc. which requires six atoms per unit cell. The proposed structure on this basis placed:

6 Barium Atoms $-\frac{1}{2}00,0\frac{1}{2}0,\frac{1}{2}\frac{1}{2}0,\frac{1}{2}0\frac{1}{2},0\frac{1}{2}\frac{1}{2},\frac{1}{2}\frac{1}{2}\frac{1}{2}$

12 Lithium Atoms - $x2x\overline{z}$; $2x\overline{x}\overline{z}$; $xx\overline{z}$; $2xx\overline{z}$; $2x\overline{z}$; $\overline{x}z\overline{z}$; $\overline{x}z\overline{z}$

6 Lithium Atoms - $x00,0x0,x0\frac{1}{2},0x\frac{1}{2},\bar{x}\bar{x}0,\bar{x}\bar{x}\frac{1}{2}$

4 Lithium Atoms $-\frac{121}{334}, \frac{123}{334}, \frac{211}{334}, \frac{213}{334}$

2 Lithium Atoms - $00\frac{1}{4}$, $00\frac{3}{4}$

which results in the space group D₃h.

The barium used in this investigation was fractionally distilled. Its purity, determined gravimetrically and spectrographically, was 99.82%. The major impurity, calcium, was present to the extent of 0.05%. The melting point was 725 $^{+}1^{\circ}$ C, and the body-centered cubic cell size $a_{o} = 5.0264$ $^{+}0.0003$ A.U. at 25°C. (Copper K_{α} radiation $\lambda = 1.54050$). The lithium used in this study analyzed 99.86%. Its melting point was found to be 180.5°C.

The following thermodynamic functions were determined from the resulting equilibrium diagram.

Barium Lithium

Molal entropy of fusion 1.91 ± 0.046 kcal/deg. 1.62 ± 0.114 kcal/deg. Molal enthalpy of fusion 1.90 ± 0.045 kcal/deg. 0.736 ± 0.050 kcal/deg. Microfilm \$2.00; Xerox \$4.40. 85 pages.

SORPTION OF ORTHOPHOSPHATE AND NONORTHOPHOSPHATE PHOSPHORUS BY SOILS

(L. C. Card No. Mic 58-7581)

Charles Owen Scott, Ph.D. Iowa State College, 1958

Supervisor: C. A. Black

Indications from field experiments are that, as a source of phosphorus for plant growth, calcium metaphosphate and superphosphate differ in relative effectiveness among soils. The present investigation represents preliminary work on the hypothesis that these differences are associated with the relative sorption of metaphosphate and orthophosphate phosphorus by the various soils. The general procedure followed in the work with soils was to measure the concentration of orthophosphate and nonorthophosphate phosphorus in solution before and after equilibration of various phosphate solutions with soils.

Samples of different soils from midwestern and western United States were employed. In the experiments on phosphorus sorption, 5-gram samples of air-dry soil were equilibrated for 24 hours with water and then for 24 or 168 hours at 5°C. or room temperature with phosphate solutions, the phosphorus content of which was measured before and after contact with the soil.

The sources of phosphorus employed included fertilizergrade materials produced by the Tennessee Valley Author-

ity and reagent-grade chemicals.

With varying proportions of orthophosphate and nonorthophosphate phosphorus and a fixed total concentration in the solution added, an attempt was made to express the relative sorption of the two forms of phosphorus by the parameter c in the equation, $p_n/(p_n+p_0)$ sorbed = $[p_n/(p_n+p_0)]$ p_0) added \overline{c} . In this equation p_n = nonorthophosphate, po = orthophosphate, and the units of both were micrograms of phosphorus per gram of soil. To take into account the indigenous soil orthophosphate, the labile soil orthophosphate found by isotopic dilution of P32O4 was measured and added to the orthophosphate in the original solution. The data did not fit the model, however, two possible causes being accelerated hydrolysis of the nonorthophosphate to orthophosphate in the presence of soil and exchange of nonorthophosphate for orthophosphate not effective in diluting added P32O4.

Despite the foregoing difficulty there is little doubt of the existence of preferential sorption of nonorthophosphate in most of the soils tested because the decrease in total concentration of phosphorus during contact with the soil was greater with solutions containing nonorthophosphate phosphorus than with solutions of the same phosphorus concentration containing only orthophosphate phosphorus. The preferential sorption of total phosphorus from solutions containing mostly nonorthophosphate over those containing only orthophosphate differed among the various phosphate sources. The preferential sorption tended to increase with time in all soils, but especially in the acid soils. The preferential sorption was most marked in certain alkaline soils.

Microfilm \$2.00; Xerox \$5.40. 106 pages.

INFRARED INVESTIGATION OF VANADIA-SILICA GEL CATALYSTS

(L. C. Card No. Mic 58-7958)

Donald Dunne Woolley, Ph.D. University of Utah, 1958

Chairman: George Richard Hill

In the attempt to study the behavior of catalysts systematically, one approach has been to follow chemical changes in the catalytically active compound during its use. Recent development of the potassium bromide pressed crystal technique for obtaining the infrared spectra of solids provides a method of studying catalysts in various stages of activity. This paper discusses such an investigation applied to both promoted and unpromoted vanadiasilica gel catalysts.

For the new, potassium sulfate promoted catalyst, spectral results indicate that vanadium is present in the form of mixed complex (or double) salts of the type $K_2SO_4 \cdot (NH_4)2SO_4 \cdot xVOSO_4 \cdot yH_2O$ before it is placed in use.

The steady state catalyst does not contain detectable amounts of either $V_2O_{4:34}$ or V_2O_5 . The ammonium complex decomposed corresponding to somewhat decreased activity toward CO oxidation of the catalyst in the steady state. This result led to prediction that rubidium salts would be better promoters; this has been observed to be true. Deactivation, by over-reducing carbon monoxide, produces V_2O_3 as the decomposition product of the above complex salts.

Promoter action of the alkali metals is discussed in the light of the spectral evidence. It appears that the alkali metal ions are cations in complex salts with vanadium "promoted" to the role of the center of an anionic coordination structure. These compounds are in need of further investigation, but their microcrystalline nature suggests that they serve as dispersants; they thus show enhanced activity due to a greater effective surface area. In addition, these compounds may be more reactive species than the simple oxides. They provide for selective partial oxidation of organic compounds through the formation of complex intermediate chemical species. Increase in the size of the alkali metal cation is proposed to promote more reactive liquid-like structures in which rotation is less restricted. Physical and chemical properties of these compounds, plus known preferred ratios of K2SO4: V2O5 in these oxidation catalysts, offer strong support of these spectral results.

An unpromoted activated catalyst contains the catalytic component as $V_2O_{4.34}$ prior to long use. At steady state, formation of a solid solution of the higher oxides of vanadium and SiO_2 is indicated.

This method of catalyst study appears to be of general applicability within the limits outlined in a brief review of solid state infrared absorption.

Microfilm \$2.00; Xerox \$4.60. 90 pages.

CHEMISTRY, ORGANIC

CHLORINATION, CHLORINOLYSIS AND CRACKING OF β , β '-DICHLORODIETHYL ETHER

(L. C. Card No. Mic 58-5562)

Allen Parker Arnold, Ph.D. Case Institute of Technology, 1958

Chlorodiethyl ethers with 4-7 chlorine atoms per molecule were prepared by liquid-phase chlorination at 100-174°C. in the presence of U.V. light. The chlorinated products were submitted to chlorinolysis and cracking at 400-475°C. with residence times of 0.1-5.0 seconds. Dehydrochlorination resulted in the formation of unsaturated chloroethers. Rupture at the ether linkage formed chloroacetaldehyde and all three chloroacetyl chlorides as well as every chlorinated isomer of ethylene from vinyl chloride to tetrachloroethylene. Smaller amounts of methylene chloride, chloroform, and carbon tetrachloride were produced also. Microfilm \$2.00; Xerox \$3.60. 62 pages.

THE ACTION OF SEVERAL NUCLEOPHILIC REAGENTS ON ARYL AND HETEROCYCLIC ESTERS OF SULFONIC ACIDS

(L. C. Card No. Mic 58-5930)

Joseph Yarnall Bassett, Jr., Ph.D. The University of North Carolina, 1958

Supervisor: Joseph F. Bunnett

The reactions of several nucleophilic reagents with a series of activated-aryl arenesulfonates were investigated by isolation and identification of the reaction products. The nucleophilic reagents used were piperidine, aniline, methoxide ion, phenoxide ion, thiophenoxide ion, ethyl acetoacetate anion, and ethyl glycinate. The esters used were the 2-nitro-, 4-nitro-, and 2,4-dinitrophenyl esters of ptoluene- and mesitylenesulfonic acids, 2,6-dinitro-4-methylphenyl p-toluenesulfonate, and 2-(p-toluenesulfonoxy)-lepidine.

The nucleophilic reagent can attack the sulfonate ester at either of two positions, the sulfur atom of the sulfonate

group or the 1-position of the phenolic ring.

In reactions of mono- and dinitrophenyl esters, the reagents with activity centered in sulfur and carbon (thio-phenoxide and ethyl acetoacetate anion) attacked the 1-carbon preferentially, the reagents with reactivity centered in oxygen (methoxide and phenoxide) attacked the sulfur atom preferentially, and the reagents with reactivity centered in nitrogen (aniline, piperidine, and ethyl glycinate) had intermediate character. In reactions of 2-(p-toluene-sulfonoxy)-lepidine, the reagents showed less specificity, attacking one site about as readily as the other.

The results were interpreted with reference to concepts of susceptibility of the reactive sites of the esters to changes in polarizability and basicity characteristics of

the nucleophilic reagents.

The steric effect of ortho-methyl groups to nucleophilic attack on the sulfur atom of the sulfonate group was investigated by studying the differences in reaction rates of the 2,4-dinitro-, 2-nitro-, and 4-nitrophenyl p-toluene- and mesitylenesulfonates with piperidine. It was concluded from the kinetic evidence that ortho-methyl groups had little if any steric hindrance to this type reaction.

A reaction designed to furnish 4-(p-toluenesulfonoxy)-quinazoline gave instead 3-(p-toluenesulfonyl)-4-quinazolinone. The p-toluenesulfonyl group in the 3-position of the latter compound activates the 2- and 4-positions to nucleophilic attack. Aniline reacts with it to give 3-phenyl-4-quinazolinone, while water reacts with it to give N-(o-

aminobenzoyl)-p-toluenesulfonamide.

New methods for the preparation of activated-aryl arenesulfonates, for the preparation of heterocyclic esters of sulfonic acids, and for the preparation of unsymmetrical dinitrodiphenylsulfides were developed. A number of new compounds were prepared and characterized.

Microfilm \$2.00; Xerox \$6.60. 136 pages.

THE SYNTHESIS OF SOME β -(SUBSTITUTED-5-PYRIMIDYL)ALANINES

(L. C. Card No. Mic 59-640)

Benjamin Blank, Ph.D. Temple University, 1958

In an effort to prepare better and more effective anticancer agents, the synthesis of some β -(substituted-5pyrimidyl)alanines was accomplished. During the course of this study several synthetic routes for the preparation of 5-pyrimidylalanines were investigated. These included:

- 1. The reaction of a 5-halomethylpyrimidine with diethyl acetamidomalonate or ethyl acetamidocyanoacetate.
- 2. The reaction of a 5-pyrimidine carboxaldehyde with hippuric acid, hydantoin, or thiohydantoin followed by reduction and hydrolysis to the desired amino acid.
- 3. The preparation and conversion of a β -(substituted-5-pyrimidyl)-propionic acid to a β -(substituted-5-pyrimidyl)alanine via the α -bromo acid.
- 4. The condensation of a suitably substituted malonic ester with a urea-like compound to give the amino acid after removal of protecting groups.
- 5. Two miscellaneous syntheses based on the synthesis of tryptophane from gramine and indole.

Of the methods tried, the reaction of 4-amino-5-bromomethyl-2-methylthiopyrimidine hydrobromide with diethyl acetamidomalonate and the condensation of ethyl methyl α -benzamido- \mathcal{V} -carbethoxyglutarate with thiourea, were the only two which subsequently yielded compounds of the desired structure. Thus, were prepared β -(4-amino 2-hydroxy-5-pyrimidyl)alanine [β -(5-cytosinyl)alanine] and β -(4,6-dihydroxy-2-thio-5-pyrimidyl)alanine.

Microfilm \$2.00; Xerox \$8.00. 172 pages.

A PRECURSOR OF 4-AMINO-5-IMIDAZOLECARBOXAMIDE FOR E. COLI DERIVED FROM DIETHYL AMINOMALONATE

(L. C. Card No. Mic 58-7834)

Paul T. Condit, Ph.D. Princeton University, 1958

4-Amino-5-imidazolecarboxamide has been shown to be a purine precursor in bacteria, mice, rats, pigeons, and man. When Escherichia coli was grown in the presence of sulfonamides, the amount of this compound formed was found to be proportional to the amount of glycine present, indicating that it was formed from glycine. This bacterial system has been used in the present investigation to examine a number of compounds for their effectiveness as precursors of 4-amino-5-imidazolecarboxamide.

Of the 19 compounds tested, only one was found to have any activity as a precursor. This compound was diethyl aminomalonate, which was nearly as effective as glycine in increasing the amount of 4-amino-5-imidazolecarbox-amide formed, but which only became active after it had been autoclaved. Paper chromatographic studies suggested

that it was converted to ethyl aminomalonate, which then served as a precursor.

The essentially equal utilization of autoclaved diethyl aminomalonate and glycine, indicated that both compounds were converted to a common intermediate which served as a precursor. Aminomalonic acid could be formed either by the hydrolysis of ethyl aminomalonate or by the addition of carbon dioxide to glycine, but it was found to be inactive in this system and therefore was not such an intermediate. If instead of hydrolysis, amidation of ethyl aminomalonate were to occur, aminomalonamic acid would be produced, which could also be formed from glycine by the addition of a carbamyl group. While the synthesis of this compound has not yet been successful, so that its activity in this system is unknown, aminomalonamic acid is proposed as the common intermediate to which both glycine and diethyl aminomalonate are converted.

The identity of other compounds intermediate between glycine and 4-amino-5-imidazolecarboxamide on this proposed pathway is not known, but aminomalonamide, formamidomalonamide, ureidomalonamide, and formamidomalonamidine were all found to be inactive in the present study.

The pathway of purine biosynthesis in pigeon liver homogenates has been found by Greenberg and Buchanan to begin with the conversion of glycine to glycinamide ribotide. The various steps involving aliphatic ribotides lead by way of 4-amino-5-imidazolecarboxamide ribotide to inosinic acid. The utilization of a derivative of diethyl aminomalonate as a precursor of 4-amino-5-imidazolecarboxamide in E. coli, together with the observation that glycinamide ribotide was inactive in this system, suggest that a different pathway of purine biosynthesis may be present in this organism.

Microfilm \$2.00; Xerox \$4.80. 93 pages.

ACTION OF ACID ON SALTS OF 5-NITRONORBORNENES

(L. C. Card No. Mic 58-7396)

James Hallis Cooley, Ph.D. University of Minnesota, 1958

Adviser: Wayland E. Noland

In every case reported the salts of 5-nitronorbornenes fail to hydrolyze to ketones in acid solution (the Nef reaction). The purpose of this investigation was to find out what did occur when the sodium salt of 5-nitronorbornene was treated with hydrochloric acid. By studying this anomaly of the Nef reaction it was hoped that insight into the reaction mechanism might be gained.

When an ice-cold aqueous methanolic solution of 5-nitronorbornene was added to dilute hydrochloric acid at -20 to -10°, a rearrangement product was formed that was shown to be cis-6-cyclopentene(e)tetrahydro-1,2-oxazin-3-one (Compound A).

That this rearrangement product had a hydroxamic ester linkage was deduced from the following series of experiments: Compound A was reduced with platinum and hydrogen under low pressure to a dihydro derivative, ciscyclopentana(e)tetrahydro-1,2-oxazin-3-one (Compound B). Compound A was reduced to a tetrahydro derivative, cis-

2-hydroxycyclopentaneacetamide (Compound C) with Raney nickel and hydrogen under low pressure. Compound C could also be prepared from Compound B by reduction with iron and water. Hydrolysis of Compound C with sodium hydroxide gave the known lactone, cis-cyclopentana(b) tetrahydrofuran-2-one ("Saturated Lactone"). The hydroxy group in Compound C was shown by the preparation of a phenyl urethane derivative. The amide NH2 was demonstrated by a Schotten-Baumann reaction from which benzamide was produced and by a reaction with nitrous acid from which nitrogen was produced. The saturated lactone was prepared by a known procedure and the physical constants of the two samples were identical. Compound C was prepared by ammonolysis of the saturated lactone. It was then concluded that hydrogenation of Compound A with a platinum catalyst had reduced only the double bond, and that hydrogenation of Compound A with a Raney nickel catalyst had cleaved the nitrogen-oxygen bond of the hydroxamic ester as well as reducing the double bond. Compound A had the chemical properties of a hydroxamic ester; it was weakly acidic and did not give a ferric chloride test.

The location of the double bond in Compound A was carried out as follows: Compound A was nitrosated with a nitrous acid solution, and a yellow solid N-nitroso derivative was formed. This N-nitroso A slowly decomposed, losing nitrous oxide and giving an unsaturated lactone, cis-5-cyclopentene(b)tetrahydrofuran-2-one. This lactone was hydrolyzed in sodium hydroxide solution, and was then regenerated by acidification. The unsaturated lactone failed to give a Legal test when treated with sodium nitroprusside in basic solution. Both of these tests rule out the enolic lactone possibility. When the lactone was hydrogenated under low pressure with a platinum catalyst, cyclopentaneacetic acid was produced. Clearly the double bond is in a position to influence the lactone oxygen and produce hydrogenolysis. Since the enolic position was ruled out, the allylic position is left as a possibility.

Compound A was shown to be dimorphic. The differences in the infra red spectra in Nujol and in potassium bromide of the two dimorphic forms were listed. Methods of transformation of one form to the other were also found.

The ultra violet and visible spectrum of N-nitroso A was estimated by extrapolating its rate of decomposition back to zero time.

An attempt to carry out a rearrangement with 5-nitro-6-phenylnorbornene similar to that with 5-nitronorbornene failed. Microfilm \$2.00; Xerox \$5.20. 104 pages.

THE SYNTHESIS AND REACTIONS OF TETRAALKYLMETHANES

(L. C. Card No. Mic 58-7442)

Richard Joseph DeFeo, Ph.D. University of Missouri, 1958

Supervisor: Dr. Norman Rabjohn

A general procedure for the preparation of tetraalkylmethanes, first employed by Phillips, has been further developed to allow its use for the synthesis of quaternary hydrocarbons, either symmetrical or unsymmetrical, of almost any configuration or molecular weight range. CHEMISTRY 1919

Employing this method, the following quaternary hydrocarbons have been prepared: 5-methyl-5-ethyldecane, 4,4-dipropylundecane, tetraisobutylmethane, 10-propyl-10-butyleicosane, 8,8-diheptylpentadecane, 10-heptyl-10-octyleicosane, 12-nonyl-12-decyltetracosane, and 13-heptyl-13-decyltritriacontane. The physical properties of specific gravity, viscosity, viscosity index, refractive index, boiling point, and solidification point were determined for each compound. All of the alkanes are liquids at room temperature.

The synthetic scheme employed for the preparation of the tetraalkylmethanes is based upon the condensation of a ketone with ethyl cyanoacetate to form an alkylidene ester derivative, which in turn is treated with a Grignard reagent to yield a trisubstituted cyano ester. The latter is hydrolyzed and decarboxylated to give a trisubstituted propionitrile. The nitrile is caused to react with a Grignard reagent to give a ketone which then is reduced to the corresponding alcohol. Dehydration of the alcohol affords a mixture of two olefins, which is hydrogenated to the desired alkane.

The possibility of molecular rearrangement of the carbon skeleton during the acidic dehydration of the highly branched alcohols was investigated. To prove that no rearrangements occurred, the same quaternary hydrocarbon, 5-methyl-5-ethyldecane, was synthesized by five different methods, two of which employed the above series of reactions including the dehydration step, and three of which made use of reactions which allowed no possibility of rearrangements. The lack of rearrangement was confirmed by a study of the products of the ozonization of three of the olefin mixtures obtained during the dehydration of the alcohols. The expected mixture of four acids was obtained from the ozonization in each case.

A preliminary study of some of the reactions of tetraalkylmethanes was undertaken. These reactions were oxidation, aromatization, and thermal stability.

The oxidation of a quaternary hydrocarbon seems to be more rapid than the oxidation of a normal hydrocarbon under the same conditions. This apparent ease of oxidation indicated a decreased stability of a hydrocarbon due to the presence of a quaternary atom in its structure.

The lack of stability also was suggested by the aromatization of 8,8-diheptylpentadecane. Under conditions by which n-heptane was converted to toluene, the quaternary hydrocarbon decomposed to smaller fragments, with toluene as one of the major products.

The overall thermal stability of the quaternary system was compared with those of other hydrocarbon structures, and the quaternary structure appears to be the most stable. The neopentane portion of the molecule seems to be very stable, while the alkyl chains attached to the central atom apparently are the weakest links in the molecule as a whole.

Microfilm \$2.20; Xerox \$7.80. 166 pages.

THE REACTIONS OF CERTAIN HALOGENATED ACIDS, ESTERS AND KETONES WITH ORGANOMETALLIC COMPOUNDS

(L. C. Card No. Mic 59-27)

Kenneth T. Dishart, Ph.D. University of Pittsburgh, 1958

As a result of the present investigation, a general, one-step method has been developed for the synthesis of fluorinated ketones of the types $C_nF_{2\,n+1}$ COR, CClF₂COR and CCl₂FCOR (R = an alkyl or aryl radical and n = 1, 2 or 3). The method involves the interaction of the available halogenated carboxylic acids, CF₃CO₂H, C₂F₅CO₂H, n-C₃F₇-CO₂H, CClF₂CO₂H and CCl₂FCO₂H with Grignard reagents.

In the reactions between the perfluorinated acids and Grignard reagents, mixtures of ketones and carbinols were obtained. When the Grignard reagent was phenylmagnesium bromide or methylmagnesium iodide the carbinol obtained was tertiary, while with the aliphatic Grignard reagents, which contain beta-hydrogen atoms, the carbinol was predominantly secondary. In all of the experiments the ketone was the major product. The following perfluoroalkyl ketones were prepared: CF₃COC₆H₅ (58%), CF₃COC₃-H₇-n (51%), CF₃COC₃H₇-i (34%), CF₃COC₄H₉-n (52%), CF₃COC₄H₉-t (15%), CF₃COC₆H₁₃-n (69%), C₂F₅COC₆H₅ (76%), C₂F₅COC₄H₉-n (49%), n-C₃F₇COC₆H₅ (78%), n-C₃F₇COC₃H₇-n (44%), n-C₃F₇COC₃H₇-i (25%) and n-C₃F₇COC₄H₉-n (53%).

The reaction of trichloroacetic acid and phenylmagnesium bromide in refluxing ethyl ether was studied. In contrast with the results obtained with trifluoroacetic acid, none of the expected trichloroacetophenone was isolated. Instead, a mixture of biphenyl, dichloroacetic acid, phenylchloroacetic acid, and diphenylacetic acid was obtained.

It has been found that chlorodifluoroacetic acid behaves like trifluoroacetic acid in its reactions with Grignard reagents, and gives ketones, CClF₂COR, as the major products and carbinols as the minor products. The carbinols were either exclusively tertiary alcohols or mixtures of secondary and tertiary alcohols depending on the structure of the Grignard reagent. The following ketones were prepared: CClF₂COC₆H₅ (77%), CClF₂COC₆H₄Cl-p (77%), CClF₂COC₄H₅ (51%), CClF₂COC₃H₇-n (55%) and CClF₂COC₄H₈-n (66%).

Dichlorofluoroacetic acid appears to have the properties of both trifluoroacetic acid and trichloroacetic acid. Thus, from the reaction of dichlorofluoroacetic acid and phenylmagnesium bromide, phenylchloroacetic acid and biphenyl were isolated in addition to the ketone, CCl₂-FCOC₆H₅ (66%), and carbinol, CCl₂FCOH(C₆H₅)₂ (7%). Two other ketones prepared from dichlorofluoroacetic acid were CCl₂FCOC₆H₄Cl-p (41%) and CCl₂FCOC₄H₉-n (28%).

Next the reactions of the ethyl esters of the chlorodifluoro- and dichlorofluoro-acetic acids with Grignard reagents were studied. When these esters were treated with Grignard reagents having beta-hydrogen atoms, the secondary alcohol, $CClF_2CH(OH)R$ or $CCl_2FCH(OH)R$, was the major product (78-94%) and the tertiary alcohol, $CCl-F_2C(OH)R_2$ or $CCl_2FC(OH)R_2$, was the minor product (0-15%) in each case. The reactions with methylmagnesium iodide gave exclusively the tertiary alcohols, $CClF_2COH-(CH_3)_2$ (85%) and $CCl_2FCOH(CH_3)_2$ (93%). While the

reaction of ethyl chlorodifluoroacetate with phenylmagnesium bromide gave the tertiary alcohol, $CClF_2COH(C_6H_5)_2$ (84%), as the sole product, the reaction of ethyl dichlorofluoroacetate with this Grignard reagent gave the tertiary alcohol, $CCl_2FCOH(C_6H_5)_2$ (60%), chlorobenzene, and biphenyl. The reactions of p-chlorophenylmagnesium bromide with these two esters were complex, since in addition to the tertiary alcohols, $CClF_2COH(C_6H_4Cl-p)_2$ (62%) and $CCl_2FCOH(C_6H_4Cl-p)_2$ (41%), the biaryl coupled product, 4,4'-dichlorobiphenyl, and a large quantity of a yellow polymeric solid were isolated in each case.

Finally, the reactions of the chlorofluoroacetic acids and their ethyl esters with phenyllithium were investigated. When chlorodifluoroacetic acid or dichlorofluoroacetic acid was added to phenyllithium in refluxing ethyl ether, there was obtained a mixture of benzophenone and tetraphenylethylene. When $CClF_2CO_2C_2H_5$ was added to phenyllithium in refluxing ethyl ether, there was obtained $CClF_2-COH(C_6H_5)_2$ in 82 per cent yield. In addition, a nonhalogenated compound, phenyl benzhydryl ketone, was isolated. The reaction of $CCl_2FCO_2C_2H_5$ with phenyllithium was quite complicated. From this reaction there were isolated chlorobenzene, diphenyl-(dichlorofluoromethyl)-carbinol, chlorofluoroacetophenone, phenyl benzhydryl ketone, and tetraphenylethylene.

Microfilm \$2.20; Xerox \$7.80. 166 pages.

FRACTIONATION AND CHEMICAL NATURE OF THIOLIGNIN

(L. C. Card No. Mic 58-7589)

Paul Edward Drummond, Ph.D. Vanderbilt University, 1958

Supervisor: Professor Lamar Field

A commercial thiolignin (Indulin A) was fractionated by selective precipitation from dioxane with ethyl acetate, ether and cyclohexane in sequence.

This thiolignin also was fractionated by stepwise acidification of an alkaline solution. Fractions were obtained within the pH ranges of 10.4-8.3 (I-1, 60%), 8.3-6.7 (I-2, 18%), and 6.7-3.5 (I-3, 21%). The sulfur contents and molecular weights were 1.09%, 651 (I-1): 1.35%, 955 (I-2): 1.02%, 802 (I-3). The intermediate fraction (I-2) was fractionated further by partial solution in acetone to yield three fractions, the most soluble of which (II-1) had a sulfur content of 1.23% and a molecular weight of approximately 1050. In a third stage of fractionation, Fraction II-1 was chromatographed on alumina by P. H. Riggins and yielded nine fractions which showed distinguishing differences but considerable general similarity. Since thiolignin evidently consists of a considerable number of substances of great general similarity, chemical studies were done with the original thiolignin.

Tests of thiolignin with reagents capable of yielding specific colorations with native lignin invariably were negative, indicating that the kraft process effects marked modification of the groups in lignin responsible for these

Raney nickel in dioxane removed approximately onehalf of the sulfur from thiolignin. Dilute alkali removed one-quarter to one-third, and the combination of Raney nickel and dilute alkali removed two-thirds of the sulfur. These results indicate the possibility of at least three types of sulfur linkages in thiolignin: one which is labile toward Raney nickel, one which is labile toward dilute alkali, and one which is stable toward both of these reagents. Since the infrared spectra of the desulfurized products show characteristic absorption frequencies in the region assigned to sulfoxide, the sulfoxide linkage is a possibility for the stable form of sulfur linkage. Adsorbed colloidal sulfur or sodium sulfide evidently are not factors in these results because the sulfur content was not changed significantly by treatment of thiolignin with carbon disulfide or water.

The absence of a thiol group in thiolignin was inferred from negative tests with sodium azide - iodine reagent, which also shows the absence of a thiocarbonyl grouping.

Reduction of thiolignin with lithium aluminum hydride, aqueous potassium borohydride and potassium borohydride in the presence of aluminum chloride, followed by treatment of the resulting products with sodium azide-iodine solution demonstrated that thiolignin does not contain a disulfide or polysulfide linkage, and probably also confirms the absence of a thiocarbonyl group.

Lack of formation of a sulfonium salt of thiolignin with phenacyl bromide, benzyl chloride and methyl iodide under a variety of conditions indicated that, if a sulfide linkage is present, it lacks the properties typical of a dialkyl sulfide.

Methylation of thiolignin with methyl sulfate and 30% aqueous sodium hydroxide at 25° produced a methylated thiolignin with a methoxyl content of 26.10%. Four methylations sufficed although six were used. From these studies, seemingly there are eleven free hydroxyl groups per gram-atom of sulfur in thiolignin.

The "methylated thiolignin" was oxidized with hydrogen peroxide. Comparison of the infrared spectra before and after oxidation showed the disappearance of a band at 1030 cm.⁻¹, the appearance of a band at 1370 cm.⁻¹, and a change in the structure of the bands in the region of 1120-1160 cm.⁻¹. These changes indicate the possibility of oxidation of a sulfoxide linkage to a sulfone linkage.

Thiolignin thus appears to contain no thiol, thiocarbonyl, disulfide or polysulfide units. The three sulfur-containing moieties probably consist of a sulfoxide, along with sulfide units which are not typical of the dialkyl type, or other sulfur-linkages which have not been definitely excluded (e.g. sulfone or sulfonic acid, or, improbably, sulfinic acid, mercaptal or mercaptol).

Thermal decomposition of thiolignin at 450° yielded a number of oils boiling at $97\text{-}175^{\circ}$ (15 mm.). Further purification yielded a material boiling at 58° (2.2 mm.) having the apparent empirical formula $C_6H_{10}O$, which seemed to be contaminated by a thiol.

Microfilm \$2.10; Xerox \$7.40. 159 pages.

1. P. H. Riggins, M.S. Thesis, Vanderbilt University, 1958.

SOME CORRELATIONS BETWEEN ORGANOSILICON COMPOUNDS AND ORGANOGERMANIUM COMPOUNDS

(L. C. Card No. Mic 58-7558)

Mark Bernard Hughes, Ph.D. Iowa State College, 1958

Supervisor: Henry Gilman

Organic compounds containing silicon or germanium as hetero atoms have been a subject of interest as high temperature lubricants and hydraulic fluids in recent years. The possibility that trialkylsilylmetallic and trialkylgermylmetallic compounds could be interacted with a wide variety of organic molecules to give compounds of low melting point and high thermal stability, as well as a fundamental interest in the intermediates themselves, prompted an investigation of the preparation and stability of compounds of this type.

Metalation of triethylgermane with n-butyllithium or phenyllithium in diethyl ether was slow and gave triethylgermyllithium in yields of less than 10 percent. Attempts to prepare triethylgermylmetallic compounds by cleavage of tetraethylgermane or hexaethyldigermane with lithium or sodium-potassium alloy failed. With tetraethylgermane and the alloy, colors were observed during the cleavage period and it was impossible to recover starting material or product. This was taken as an indication that triethylgermylpotassium was formed but immediately underwent reaction with the solvent in some unknown manner. Reaction between triethylchlorogermane and lithium in ether and in tetrahydrofuran gave hexaethyldigermane in 60 and 18 percent yields, respectively.

Endeavors to prepare trialkylsilylmetallic compounds were unsuccessful. Hexaethyldisilane and various trialkylarylsilanes were unaffected by lithium or sodiumpotassium alloy in diethyl ether. In tetrahydrofuran or ethylene glycol dimethyl ether, lithium reduced the aryl substituent of trialkylarylsilanes without cleavage. With sodium-potassium alloy in tetrahydrofuran at -50°, cleavage of trimethylphenylsilane and triethylphenylsilane did occur. It was possible to derivatize the phenyl potassium so formed in yields of about 80 percent but derivatives of the trialkylsilylpotassium could not be isolated, indicating that this class of compounds is extremely reactive.

Various organosilicon hydrides were prepared and the chemical and physical properties of the silicon-hydrogen bond investigated. Although there is little evidence of reaction in diethyl ether, organosilicon hydrides do react with Grignard reagents in tetrahydrofuran under specific reaction conditions. Alkylsilanes of the type RSiH₃ react with alkyl, aryl, or aralkyl Grignard compounds in a 1:1 ratio to give RR'-SiH₂ compounds in fair yields. Dialkylsilanes, R₂SiH₂, react only with active Grignard compounds, such as allylmagnesium chloride, to give a trisubstituted silane and then only in low yields.

The infrared spectra of the organosilicon hydrides prepared were investigated. The band attributed to stretching of the silicon-hydrogen bond was found to shift to lower frequencies as the number of hydrogens attached to a silicon atom decreased. Further variations due to mesomeric and hyperconjugative contributions of the organic groups were also observed, implying double bond character to silicon-carbon bonds.

A copper(II) chloride-pyridine-water reagent was found to be a rapid and simple indicator of the degree of substitution of an organosilicon hydride. For the purpose of this review, a literature search for data pertinent to each of the three sections prior to April, 1958, has been made.

Microfilm \$2.00; Xerox \$5.60. 114 pages.

THE INTERACTION OF CARBOXYLIC ACIDS, THEIR SALTS, ESTERS AND ANHYDRIDES WITH ORGANOMETALLIC COMPOUNDS

(L. C. Card No. Mic 59-32)

Marvin J. Karten, Ph.D. University of Pittsburgh, 1958

The course of the reactions of organolithium compounds with carboxylic acids and their lithium salts was studied. When a lithium salt of a carboxylic acid (one equivalent) was added to phenyllithium (one equivalent) followed by a short reflux period (one-half hour), there was obtained a mixture of ketone (8-40%) and tertiary alcohol (22-30%). When the reflux period was increased to 24 hours, only ketone (79-89%) was usually obtained. It has been suggested that the course of this reaction involves the forma-

tion of R -
$$\overset{\mbox{O}^-}{\mbox{C}}$$
 - $\overset{\mbox{O}}{\mbox{C}}$ Li₂·(C₂H₅)₂O (R = alkyl or C₆H₅), the C₆H₅

precursor of the ketone, from the reaction of phenyllithium with the lithium salt of the carboxylic acid. The precursor of the ketone can further react with phenyllithium to give C_6H_5 : QLi $_+$

 $R - \overset{+}{C} - \overset{+}{O}Li_2 \cdot 2(C_2H_5)_2O$, the precursor of the tertiary C_6H_5

alcohol. Both the precursor of the ketone and the precursor of the tertiary alcohol are present in the reaction mixture at the end of the one-half hour reflux period and quenching of the reaction mixture gives both ketone and tertiary alcohol. However, the precursor of the tertiary alcohol may react completely with the lithium salt of the carboxylic acid during the longer reaction time (24 hours) to give only the precursor of the ketone. Thus, quenching of the reaction mixture at the end of the 24-hour reflux period yields only ketone.

The reaction of a carboxylic acid (one equivalent) with phenyllithium (two equivalents) usually yields both ketone (49-60%) and tertiary alcohol (22-30%) regardless of whether the reflux time is one-half hour or 24 hours. The fact that tertiary alcohol is obtained from the reaction of one equivalent of a carboxylic acid with two equivalents of phenyllithium even in a 24-hour reaction time, has been attributed to a reaction between the carboxylic acid and

-Li $C_6H_5:O$ $R-C-OLi_2\cdot 2(C_2H_5)_2O$ to give the lithium salt of the C_6H_5 OLi tertiary alcohol, $R-C-C_6H_5$. The lithium salt of a ter- C_6H_5

tiary alcohol was shown to be unable to react with the lithium salt of a carboxylic acid in refluxing ether and consequently, upon hydrolysis, tertiary alcohol is obtained.

The scope and limitations of the reactions of certain organolithium compounds with saturated, unsaturated, aromatic, and heterocyclic acids; the lithium salts of carboxylic acids; esters and anhydrides were determined. The reactions of organolithium compounds and the corresponding

Grignard reagents with the same organic substrate were compared, in certain cases, to determine the effect of the nature of the organometallic compound on the course of the reactions.

The reaction of two equivalents of phenyllithium with one equivalent of a saturated, aromatic or heterocyclic acid generally gave a mixture of ketone and tertiary alcohol with ketone being the major product. Thus, pivalic acid gave t-butyl phenyl ketone (65%) and t-butyldiphenyl-carbinol (26%); anisic acid gave 4-methoxybenzophenone (73%) and 4-methoxytriphenylcarbinol (13%); furoic acid gave 2-furyl phenyl ketone (47%) and diphenyl-2-furylcarbinol (5%).

Crotonic acid (one equivalent) gave crotonophenone (1, 2-addition product) (22%), β -phenylbutyrophenone (1,2-; 1,4-addition product) (20%) and no β -phenylbutyric acid (1, 4-addition product) when treated with phenyllithium (two equivalents) under Standard Addition conditions (that is, the acid was added to the phenyllithium). Under Standard Addition conditions, crotonic acid (one equivalent) reacted with phenylmagnesium bromide (two equivalents) to give β -phenylbutyric acid (43%), β -phenylbutyrophenone (18%), and no crotonophenone.

Aliphatic or aromatic esters (one equivalent) and phenyllithium (one equivalent) generally react to give carbinol as the major and frequently the only product. Thus, ethyl anisate gave 4-methoxytriphenylcarbinol (65%) and ethyl phenylacetate gave benzyldiphenylcarbinol (76%). The α , β -unsaturated ester, methyl crotonate, gave only β -phenylbutyrophenone (68%).

Crotonic anhydride (one equivalent) gave only a small amount of crotonophenone (11-13%) when treated with phenyllithium (one equivalent) at -70°C., while the reaction of equivalents of crotonic anhydride and phenylmagnesium bromide at -70°C., using Reverse Addition conditions, gave a 59% yield of crotonophenone.

Microfilm \$2.40; Xerox \$8.40. 184 pages.

THE CHEMISTRY OF SOME FUSED PYRIMIDINE RING SYSTEMS

(L. C. Card No. Mic 58-7854)

Robert John Knopf, Ph.D. Princeton University, 1958

Several synthetic routes to the pyrimido(4,5-d)pyrimidine ring system have been explored which employ 4-amino-5-cyanopyrimidines and 4-aminopyrimidine-5-carboxamides as the key intermediates. These intermediates have been cyclized by several different methods with the result that a number of derivatives of the pyrimido(4,5-d)-pyrimidine ring systems have been prepared. In certain instances it has been shown that replacement reactions can be successfully effected on derivatives of this fused ring system, while in other instances attempts to effect such reactions have been observed to lead chiefly to ring cleavage or decomposition.

The pyrimido(4,5-d)pyrimidine ring system has been found to be extremely susceptible to ring cleavage under alkaline conditions. This unusual lability to alkali has been explained on the grounds of the inherent electron deficient nature of a bicyclic ring system containing an accumulation

of nitrogen atoms. The localization of negative charge on these hetero atoms seriously disrupts the "aromaticity" implied in the structural similarity of this ring system to that of naphthalene. This behavior finds precedent in other poly hetero-atom ring systems such as pteridine and triazine. Experimental results indicate that ring-opening of the pyrimido (4,5-d)pyrimidine ring system occurs via nucleophilic attack of base at the 2 position of the bicyclic system, and reaction mechanisms which have been suggested to account for the observed cleavage reactions are based upon this assumption.

The "dimerization" reaction which certain aromatic and heterocyclic ortho amino-nitriles undergo when treated with liquid ammonia or sodium alkoxides has been investigated in considerable detail and the structure of the dimeric product derived from 5-nitro-2-aminobenzonitrile has been elucidated by means of controlled hydrolytic degradation experiments followed by an independent synthesis of the key hydrolysis product. A reaction mechanism has been proposed for this remarkable "dimerization" and reasons have been put forward to account for the structural nature of the observed product. The proposed mechanism involves the formation of an amidine intermediate, which can conceivably undergo cyclization in two ways, but actually follows one path exclusively.

The dimerization reaction has been investigated on a series of substituted 2-aminobenzonitriles and has been shown to be of a non-general nature. Experimental results do suggest, however, that the incorporation of strong electron withdrawing substituents into the parent ortho amino-nitrile favors the formation of dimeric products.

Microfilm \$2.20; Xerox \$7.80. 167 pages.

THE DIMERIZATION OF ISOPRENE AT ULTRA HIGH PRESSURES

(L. C. Card No. Mic 58-3244)

Jack Peisach, Ph.D. Columbia University, 1958

The dimerization of isoprene was studied at 60 and 75° under pressures of one to 8000 kg/cm². Reactions were carried out in a newly designed collapsible Teflon reaction vessel capable of retaining liquids at temperatures higher than fifty degrees above their boiling points. The polymerization of the isoprene was inhibited with trinitrobenzene.

The reaction was found to be bimolecular with an energy of activation of 24.9 Kcals/mol and an Arrhenius A factor of 7.9 X 10⁷ l./mol.sec. at atmospheric pressure.

The products of the reaction consist of the following three fractions:

- (1) 1,4- and 2,4-dimethyl-4-ethenyl-cyclohexene-1
- (2) 1- and 2-methyl-4-isopropenyl-cyclohexene-1
- (3) 1,5- and 2,5-dimethyl-cyclooctadiene-1,5

Pressure has a marked effect on the reaction and we note a tenfold increase in the rate of dimer formation at 3000 kg/cm^2 . From a plot of pressure versus the log of the rate of dimerization, we calculate a volume of activation of -24.3 and -25.6 cc/mol at 60° and 75° respectively.

Since the volume of activation is so much smaller than the overall volume change for the reaction, we believe that the dimerization proceeds via a non-cyclic diradical mechanism.

Microfilm \$2.00; Xerox \$4.40. 81 pages.

A NOVEL ALDOL CYCLIZATION; DEGRADATION AND SYNTHESIS OF SOME NAPHTHO-BICYCLONONENE DERIVATIVES

(L. C. Card No. Mic 59-725)

Helmut Ferdinand Prahl, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor A. L. Wilds

Previous research in this laboratory by Werth and Wilfred on sodium methoxide cyclization of the diketo ester Ia gave as the major product an unknown ester $C_{20}H_{20}O_4$, isomeric with the starting ester, and smaller amounts of the normal unsaturated keto ester. The unknown ester has now been shown to be IIa, resulting from an abnormal aldol cyclization.

The corresponding acid IIb, although stable under ordinary conditions, was decarboxylated at 220° to the ketol IIc. The original ester IIa gave an acetate, could be dehydrated, but was stable toward oxidation, in agreement with the tertiary hydroxyl formulation. Analyses, infrared and ultraviolet spectra, as well as other transformations, all supported these structures.

Confirmation of the structures was obtained by synthesis. An improved method of preparing α -2-naphthylglutaric acid was developed. Cyclization gave mainly 4-ketotetrahydrophenanthrene-1-carboxylic acid, but also some of the tetrahydroanthracene isomer. Reaction as the keto ester with dimethyl carbonate, followed by addition of methyl acrylate, gave the key intermediate, the keto triester IIIa. After unsuccessful attempts at Dieckmann cyclization, the Blanc cyclization was used. Selective hydrolysis to the diacid monoester with barium hydroxide, treatment with acetic anhydride, and pyrolysis in naphthalene gave the diketo ester IVa (45% yield). Reaction of IVa with methylmagnesium iodide gave ca. 1% of the ester IIa.

For a simpler Grignard reaction the diketone IVc was desired. Attempted alkaline hydrolysis of IVa also cleaved ring D, yielding 4-ketotetrahydrophenanthrene-propionic acid. Acid hydrolysis of IVa proceeded smoothly to the acid IVb (95%). At 210° this acid was decarboxylated to the diketone IVc. Reaction of IVc with methylmagnesium iodide gave, among other products, two diols; one of these, m.p. 82-84°, was also obtained by the action of methylmagnesium iodide on IIc.

Cyclization of Ia to IIa provides an example of aldol reaction at a carbon atom activated through an aromatic ring by a ketone group. Three other compounds were treated with sodium methoxide to determine whether analogous abnormal cyclization would occur. The 1-keto isomer of Ia, 2-carbomethoxy-2-Y-ketobutyl-1-ketotetrahydrophenanthrene, gave a small amount (8%) of the abnormal cyclization product analogous to IIb. IIIb gave reverse Michael reaction, and Ib, lacking the carbomethoxyl group of Ia, gave only the normal cyclization product.

Microfilm \$2.55; Xerox \$9.00. 196 pages.

IVc R=H

NOVEL REACTIONS OF OXINDOLE COMPOUNDS

(L. C. Card No. Mic 58-7569)

John Henry Udelhofen, Ph.D. Iowa State College, 1958

Supervisor: Ernest Wenkert

The catalytic hydrogenation of the oximes of 3-acylox-indoles (I) yielded $3-(\alpha-\text{aminoalkylidene-})\text{oxindoles}$ (II) and 2-alkylindoles (III). Reduction of the corresponding 1-methyloxindoles (I) in ethanol over palladium-charcoal gave only 1-methyl-3-(α -aminoalkylidene-)oxindoles (II).

The indoles were also produced by a potassium acetate in ethanol treatment of the oximes.

The hydrogenation of the oximes (IV) of 3-hydroxy-methyleneoxindole (V) and its N-methyl derivative yielded 3-methyloxindole (VI) and 1,3-dimethyloxindole, respectively. A second oximation compound, 3-hydroxylamino-methyleneoxindole (VII) obtained from V, yielded 3-amino-methyleneoxindole (VIII) on catalytic reduction.

Acetylation of the oximes (IV) gave oxime acetates whose hydrogenation products were VIII. Acetylation of VII gave a diacetyl derivative (IX) which gave a mixture of VI and 3-acetamidomethyloxindole (X) on hydrogenation.

While VIII was stable toward hydrogenation, 3-methylaminomethyleneoxindole (XI) as well as 3-dimethylaminomethyleneoxindole gave VI as reduction product.

Acetylation of VIII and XI gave the corresponding X.

Attempted alkylations of VIII and X with ethylene bromide and potassium carbonate in acetone yielded starting materials. Attempted ring formation involving 3-chloroacetamidomethyleneoxindole (Xa) under the same conditions also gave starting materials.

Treatment of X with ethylene bromide in <u>tert</u>. butoxide solution gave a polymeric material.

Hydrolysis of 3-carboethoxymethylaminomethyleneoxindole (XI) in an effort to obtain the acid and eventually the acid chloride, resulted in cleavage to V.

Oxindole (XII) was condensed with ethyl piperidinoacetate to give $3-(\alpha-\text{hydroxy-}\beta-\text{piperidinoethylidene-})$ oxindole (XIII) which on platinum in acetic acid hydrogenation yielded mixtures whose components could not be characterized as the desired 3-alkyloxindole. Hydrogenation of the perchlorate of the piperidino compound in ethanol over palladium-charcoal gave the perchlorate of an alkyloxindole type compound which, when liberated as the free base, could not be purified by chromatography or sublimation.

3-Methyloxindole (VI) was prepared in 50% yield by treatment of 3-acetyloxindole with methyl iodide in potassium carbonate and acetone. Similar reactions with isopropyl bromide led to a 50% yield of 3-isopropyloxindole (based on recovered starting material). 3-Cyanomethyloxindole was prepared in 50% yield with chloroacetonitrile.

Microfilm \$2.00; Xerox \$5.00. 98 pages.

THE REACTION OF CARBENES WITH KETENE ACETALS CYCLOPROPANONE ACETALS

(L. C. Card No. Mic 58-7549)

Philip Leo Weyna, Ph.D. The University of Wisconsin, 1958

Supervisor: Professor S. M. McElvain

Dichlorocarbene, from the action of base on chloroform, was added to ketene acetals to yield 2,2-dichlorocyclopropanone acetals (I, II and III), which undergo pyrolysis at approximately 150° to α -chloroacrylic esters (IV, V and VI). Phenylketene dimethylacetal reacts with dichlorocarbene and potassium t-butoxide to give dimethyl t-butyl orthophenylpropiolate (VII). The mechanism was supported by the rates of reaction of potassium t-butoxide with 2,2-dichlorocyclopropanone diethylacetal (III, R = C_2H_5) and 2,2-dichloro-3,3-dimethylcyclopropanone dimethylacetal (I) to give diethyl t-butyl orthopropiolate (VIII) and dimethyl t-butyl ortho- α -chloro- β -methylcrotonate (IX), respectively.

The mechanism of the pyrolysis reaction of the 2,2-dichlorocyclopropanone acetals was shown to involve an allylic carbonium ion intermediate by the pyrolyses of (I) in the presence of methyl orthoisobutyrate and <u>n</u>-butanol to give methyl ortho- α -chloro- β -methylcrotonate (X) and n-butyl- α -chloro- β -methylcrotonate (XI), respectively.

Phenylchlorocarbene, from the action of base on benzal chloride, reacted with dimethylketene dimethylacetal to give 2-chloro-2-phenyl-3,3-dimethylcyclopropanone dimethylacetal (XII). Pyrolysis of XII yielded methyl α -phenyl- β -methylcrotonate (XIII). Benzhydryl chloride and potassium butoxide yielded benzhydryl t-butyl ether (XIV) rather than diphenylcarbene.

Although the reaction of sodium with III ($R = C_2H_5$) gave only polymer, reaction with sodium and alcohol gave cyclopropanone diethyl acetal (XV), also obtained by the action of diazomethane on ketene diethylacetal. Similar reduction of I produced β -methylcrotonaldehyde dimethylacetal (XVI). Reaction of XII with sodium and alcohol gave the cyclopropanone acetal (XVII).

Hydrolysis attempts of I failed but XV gave a mixture of chloroacetone, ethyl propionate and propionic acid when heated in its solution with concentrated hydrochloric acid.

Bromination of XV gave ethyl β -bromopropionate and ethyl α,β -dibromopropionate while bromination of III (R = C_2H_5) gave β,β -dichloro- β -bromopropionate (XVIII).

Microfilm \$2.00; Xerox \$5.00. 96 pages.

MECHANISM OF THE REACTION OF DIAZOMETHANE WITH 2,4-PENTANEDIONE AND SYNTHESIS OF STERICALLY-HINDERED BETA-DIKETONES

(L. C. Card No. Mic 58-7570)

Robert Maxwell Williams, Ph.D. Iowa State College, 1958

Supervisor: George S. Hammond

<u>Part I.</u> The reaction of diazomethane with 2,4-pentanedione in the mixed solvent, 1,2-dimethoxyethane - benzene at 27.0° , was studied. The effect of added <u>p</u>-toluenesulfonic acid upon the rate, stoichiometry, and products of the reaction was determined. Separate experiments showed that an acid-catalysed polymerization of diazomethane was occurring in solutions of diazomethane containing <u>p</u>-toluenesulfonic acid.

Product analyses of reaction mixtures produced from diazomethane and 2,4-pentanedione, with and without acid catalyst, were made by gas chromatography. Authentic compounds were used for calibration. The major product of the reaction was methyl enol ether. In the reaction mixture, which contained p-toluenesulfonic acid, the methylation of the diketone proceeded concurrently with acid-catalysed polymerization of diazomethane without concommitant formation of other alkyl enol ethers. These results imply strongly that the mechanism of the reaction of diazomethane with 2,4-pentanedione involves a direct, one-step interaction between the reactants. The evidence is incompatible with a mechanism involving free ions as intermediates.

Further support for direct reaction was given by analyses of concentrations of both diazomethane and 2,4-pentanedione as functions of time. In the uncatalysed reaction, one molecule of diazomethane reacted for each molecule of 2,4-pentanedione which reacted. In the catalysed reaction, more than one molecule of diazomethane was consumed for each molecule of 2,4-pentanedione which reacted. If free cations had been produced in the uncatalysed reaction, diazomethane would have reacted with them as well as with 2,4-pentanedione, and stoichiometry would not have been 1:1.

The second order rate constant was $4.35 \pm 0.80 \times 10^{-3}$ liters per mole per minute. The second order rate constant for the acid-catalysed reaction was $11.3 \pm 2.4 \times 10^{-3}$ liters per mole per minute. Some explanations are suggested to account for the increase in rate.

Part II. Bis-tertiarybutylacetylmethane was prepared by condensation of methyl neopentyl ketone with ethyl tertiary-butylacetate in the presence of lithium amide. The ketone was prepared by oxidation of disobutylene with sodium dichromate and sulfuric acid. Synthesis of the ester commenced with chlorination of neopentane to give neopentyl chloride. The chloride was converted to the Grignard reagent and carbonated. The resulting acid, tertiarybutylacetic acid, was converted to the acid chloride and treated with ethanol to form ethyl tertiarybutylacetate.

Triethylacetic acid was prepared in small quantities by alkylation of acetonitrile with ethyl iodide in the presence of sodium amide. The acid was prepared in larger amounts by alkylation of triethylcarbinyl diethylacetate with ethyl bromide by use of sodium amide. The ester, triethylcarbinyl triethylacetate, was hydrolysed to triethylacetic acid.

In the reaction of triethylacetyl chloride with methyl-magnesium bromide, it was found that addition of the acid chloride to the Grignard reagent led to the formation of tertiary alcohol rather than to bis-triethylacetylmethane.

Microfilm \$2.00; Xerox \$5.20. 102 pages.

THERMAL DEGRADATION OF ALKYL N-PHENYLCARBAMATES AND OF ETHYL CARBAZOLE-9-CARBOXYLATE

(L. C. Card No. Mic 58-5303)

George Carlin Wright, Ph.D. University of Delaware, 1958

The thermal degradation of three mono-N-substituted carbamates was studied quantitatively. These compounds consisted of DL-methylphenylcarbinyl N-phenylcarbamate, benzyl N-phenylcarbamate, and ethyl N-phenylcarbamate. The first compound was much less stable to heat than the second or third.

Ethyl N-phenylcarbamate dissociated nearly quantitatively into phenyl isocyanate and ethyl alcohol at 190-200° under reduced pressure. Limited heating at 220-230° gave carbon dioxide and sym-diphenylurea in small quantities. Longer heating at 230-260° gave triphenylisocyanurate and a greater yield of carbon dioxide.

The degradation of DL-methylphenylcarbinyl N-phenyl-carbamate at 230-260° yielded carbon dioxide, aniline, styrene, and DL-phenylethylaniline as the major products. This carbamate underwent an elimination reaction to give an olefin much more readily than ethyl N-phenylcarbamate. Evidence was obtained which supported an initial intramolecular degradation, followed by amine displacement reactions.

The degradation of benzyl N-phenylcarbamate at 250-300° yielded carbon dioxide, aniline, N-benzylaniline, N, N-dibenzylaniline, and sym-diphenylurea as the major products. The mechanism of the degradation was studied in detail. Amine displacement reactions, on the α -carbon atom of the alcoholic constituent of the carbamate, were shown to be of major importance in the degradation at 250°.

A kinetic study was made of the degradation of a di-N-substituted carbamate, ethyl carbazole-9-carboxylate.

The reaction order, activation energy and activation entropy strongly supported an intramolecular degradation.

Microfilm \$2.40; Xerox \$8.40. 184 pages.

HIGHER ALKYL MONOETHERS OF MONO- TO TETRAETHYLENE GLYCOL

(L. C. Card No. Mic 59-649)

Arthur Nelson Wrigley, Ph.D. Temple University, 1958

The mono- to tetraethylene glycol mono-n-dodecyl, tetradecyl, hexadecyl, and octadecyl ethers, R(OCH₂-CH₂)_i OH, were synthesized, four by etherification of the appropriate glycols by alcohol p-toluenesulfonates in the presence of sodium carbonate as condensing agent, ten by the reaction of the sodium salts of oligoethylene glycols with the alkyl halides, and two by the alkali-catalyzed reaction between the fatty alcohols and ethylene oxide. The tosylate method gave yields of 16 to 50 per cent; the alkyl halide method, 58 to 80 per cent; and the ethylene oxide method, 16 and 18 per cent. The alkyl halide method appeared most generally satisfactory when halides of good quality are commercially available; a modified tosylate method may be advantageous when alcohols are the point

of departure. The ethylene oxide method is applicable to compounds separable by distillation from uncombined parent alcohol and neighboring isologs, particularly if the recovered alcohol and by-products can be employed for useful purposes, or if a study of the distribution of products is of interest.

Most of the compounds were distilled at pressures of 0.010 to 0.10 mm. A roughly linear relation of boiling point to molecular weight was found for these substances. When freezing points (or melting points) were plotted against i for R(OCH₂CH₂)_iOH, minima occurred at i=3 in the case of the monododecyl, tetradecyl, and hexadecyl ethers; in the octadecyl series a minimum did not occur before i≥4. In the plots of refractive index vs. i, curvature was hardly apparent except in the dodecyl series.

Typical glycol higher alkyl monoethers had very low solubilities (below 4 per cent) in water at either room temperature or at about 75°, but were soluble in benzene, carbon tetrachloride and ethanol. In isooctane, ethylene glycol monooctadecyl ether was insoluble at room temperature. The reverse was true of tetraethylene glycol monododecyl ether. The cloud points of dilute solutions of tetraethylene glycol monooctadecyl ether in water ranged from 9.5° for 0.025% to 5.2° for 0.30%, and these appeared to represent points on the critical-solution-temperature curve.

By the fractional distillation of the mixture resulting from the sodium-alcoholate-catalyzed reaction of tetradecanol with 1.055 moles of ethylene oxide, followed by plots of refractive index and freezing points, the distribution of products was found to be in harmony with the equations of Weibull and Nycander (Acta Chem. Scand., 8, 847 (1954)). The distribution constant c had a value of about 3. Data available from alkali-catalyzed ethenoxylation of dodecanol and hexadecanol supported this order of magnitude. Plots of distribution calculated by the Flory (J. Am. Chem. Soc., 62, 1561 (1940)) and the Weibull-Nycander equations were compared for v=1, 2, and 3. For c=3, considerably more parent alcohol survives when Weibull-Nycander distribution is encountered.

Infrared spectra for typical members of the series synthesized were in harmony with the structures intended. In the finger-print region bands were found similar to those noted by Kuroda and Kubo (J. Polymer Sci., 26, 323 (1957)) in a study of CH₂ rocking vibrations of oligoethylene glycols. By analogy it is suggested that the mono- to tetraethylene glycol ethers of the present series probably exist as both gauche and trans forms in the liquid state, with the former predominant.

Microfilm \$2.00; Xerox \$4.00. 74 pages.

CHEMISTRY, PHYSICAL

STUDIES OF A NICKEL-SILICA-ALUMINA ISOMERIZATION CATALYST

(L. C. Card No. Mic 58-7819)

John E. Benson, Ph.D. Princeton University, 1957

The catalytic properties of a commercial nickel-silicaalumina catalyst that is effective for the isomerization of hydrocarbons at 25 atmospheres have been studied under laboratory conditions.

The hydrogen-deuterium exchange reaction was studied in a flow system from -78°C to room temperature. The activation energy was found to be 7.6 kcal./mole.

The kinetics of the hydrogenation of cyclopropane to form propane have been investigated by a static method between 56 and 100°C. At 75°C the rate expression for the reaction was found to be

$$-dp/dt = k p_{C_3H_6}^{0.3}/p_{H_2}^{0.1}$$

with an activation energy of 15.2 kcal./mole. By assuming the rate-determining step in the catalytic hydrogenation to be the reaction between adsorbed cyclopropane and an adsorbed hydrogen atom, the observed kinetic law has been interpreted in a manner consistent with the data for the adsorption of hydrogen and cyclopropane on the catalyst.

The reaction of the catalyst with carbon monoxide was investigated, and the chemical nature of the catalyst has been discussed.

By a comparison of the results with data on other nickel catalysts it has been concluded that the nickel-silica-alumina catalyst is active for isomerization not because of compound formation between the nickel and the support nor because of the presence of the acidic support. It has been suggested that the isomerization activity results from profound changes in the properties of the catalyst when it is operating under high pressures of reactant gases.

Microfilm \$2.00; Xerox \$4.20. 78 pages.

TRANSPORT NUMBERS IN FUSED SILVER CHLORIDE-ALKALI METAL CHLORIDE SYSTEMS

(L. C. Card No. Mic 58-7572)

Allen Lee Bowman, Ph.D. Iowa State College, 1958

Supervisor: F. R. Duke

The ionic transport numbers were determined in the fused alkali metal chlorides, silver chloride, and mixtures of silver chloride with lithium, sodium, and potassium chlorides. The variation of the ionic mobilities with composition was determined for the fused system KCl-AgCl. The anion transport numbers were determined by following the migration of Cl³⁶ through a fine porosity membrane. The transport numbers of the cations in the mixtures were determined by following the migration of Ag¹¹⁰m or by the measurement of Ø in a Hittorf-type experiment.

The chloride ion carries from 25 to 45 per cent of the current in the pure alkali metal chlorides. With the

exception of cesium chloride, the transport numbers obey the relation

$$t_{-} = r_{+} / (r_{+} + r_{-})$$

where the r's are the ionic radii. The mobilities of the chloride ion are not constant, either at constant absolute temperature or at a corresponding temperature of five per cent above the absolute melting point. The chloride ion is almost completely immobile in fused silver chloride. Thus it is suggested that this salt contains a fairly rigid chloride lattice, through which the silver ions move easily.

The transport numbers in the mixtures of silver chloride with sodium and potassium chlorides are essentially the same. With lithium chloride, the general character of the curves is the same, but the lithium transport number is greater than that of sodium or potassium. Since conductivity data are not available for the AgCl-LiCl and AgCl-NaCl systems, the mobilities of the ions in these systems cannot be calculated.

When potassium chloride is added to silver chloride, the mobility of the chloride ion remains essentially zero until the concentration of potassium chloride becomes greater than 25 mole per cent, while the silver ion mobility decreases rapidly. When small amounts of silver chloride are added to potassium chloride, the mobility-composition curves indicate the presence of AgCl and AgCl₂ complex species, with formation constants of 3 and 10⁻² respectively. The assumption is made that the mobilities of the potassium and chloride ions should remain constant.

A set of equations with seven adjustable parameters was proposed to describe the conductivity, fluidity, self-diffusion coefficients, and transport numbers in a pure fused salt. The correlation of sodium nitrate data is far from satisfactory, but may be within experimental error.

Microfilm \$2.00; Xerox \$3.00. 44 pages.

COPRECIPITATION STUDIES IN SOME BINARY SYSTEMS OF SPARINGLY SOLUBLE SULFATES

(L. C. Card No. Mic 58-7211)

Allen Irving Cohen, Ph.D. Syracuse University, 1958

The coprecipitation of several cations was studied with both barium and strontium sulfates. These ions included lead, lanthanum, silver, and yttrium.

The distribution coefficient was in qualitative agreement, in all cases, with the ratio of the solubility product of the carrier and tracer sulfate. The results for the coprecipitation of lanthanum with strontium sulfate indicate that coprecipitation is by enrichment, and in accord with the ratio of their solubility products (not solubilities). Coprecipitation followed the logarithmic distribution law of Doerner and Hoskins with the exception of lanthanum with barium sulfate and yttrium and silver with barium sulfate and strontium sulfate. Yttrium and silver were found to coprecipitate only in negligible amounts and coprecipitation of lanthanum with barium sulfate was found to follow none of the distribution equations.

The coprecipitation of lanthanum with strontium sulfate followed the modified logarithmic distribution equation more closely than the Doerner-Hoskins equation. In this

system, the distribution coefficient varied qualitatively with the initial concentration of the carrier, for the modified equation.

The effect of varying the ratio of strontium to barium was studied and the distribution coefficient was found to increase as the ratio of strontium to barium became larger. It was shown that as little as 0.01 mg. barium per ml. acts as the carrier for the coprecipitation of strontium.

The value of the logarithmic distribution coefficient was shown to be dependent upon the rate of hydrolysis of the precipitant and the rate of precipitation of the carrier. As the rate of precipitation became greater, the logarithmic distribution coefficient approached a value of one. The dependence of the observed distribution coefficient upon supersaturation is suggested as a possible explanation for non-adherence of experimental distribution coefficients to the ratio of the solubility products of carrier and tracer compound.

Microfilm \$2.20; Xerox \$7.80. 166 pages.

DIELECTRIC POLARIZATION OF SOME ORGANOSILICON COMPOUNDS IN BENZENE SOLUTION

(L. C. Card No. Mic 59-25)

Anna Margaret Coleman, Ph.D. University of Pittsburgh, 1958

Dielectric constants and densities at 25°C. are reported for benzene solutions of the series of compounds: <u>meta-and para-chlorophenyltrimethylsilane</u>, -dimethylsilane, -methylsilane, and -silane, and for diethyltetramethyldisiloxane and tetramethyldivinyldisiloxane. Molar refractions and ultraviolet spectra are given for the first eight compounds listed.

The dipole moments of these organosilicon compounds, calculated by the use of the Debye and Hedestrand equations, have been found to be: meta-chlorophenyltrimethylsilane, 1.83 D; para-chlorophenyltrimethylsilane, 1.84 D; meta-chlorophenyldimethylsilane, 1.74 D; para-chlorophenyldimethylsilane, 1.69 D; meta-chlorophenylmethylsilane, 1.61 D; para-chlorophenylmethylsilane, 1.45 D; meta-chlorophenylsilane, 1.42 D; para-chlorophenylsilane, 0.99 D; diethyltetramethyldisiloxane, 0.76 D; tetramethyldisiloxane, 0.83 D; tetramethyldisiloxane, ca. 1.0 D.

The differences between the values for the observed moments and those calculated on the basis of vector addition have been interpreted in terms of possible resonance structures. A value of 0.41 D with hydrogen negative has been calculated for the $C_{aromatic}$ SiH group moment.

A compilation of dipole-moment values of silicon compounds reported to July 1, 1958, has been made, including annotations as to experimental and computation procedures.

Microfilm \$2.00; Xerox \$6.60. 140 pages.

STUDIES OF POLYSULFIDE AND POLYURETHANE POLYMERS

(L. C. Card No. Mic 58-7833)

Paul C. Colodny, Ph.D. Princeton University, 1957

A chemorheological study was made of polyurethane and polysulfide elastomers. Two types of mercaptanterminated polyester liquid polymers were prepared and the chemical stress relaxation of their cured rubbers was studied. A series of polyester-polysulfide block copolymers with varying segment length ratio was prepared and its chemorheological properties investigated.

During the course of the study of the polyurethane rubbers, two classes of these elastomers were prepared. The first series, prepared by the direct reaction of a linear polyester with a di- or tri-isocyanate and by the reaction of di- and tri-ols with isocyanate-terminated polyesters, contained predominantly ester and urethane linkages. The second group was synthesized by the addition of water to a "prepolymer" prepared by the reaction of a small excess of di-isocyanate with the polyester. This type contained equal amounts of urethane groups and combined substituted urea linkages and biuret cross linkages. From stress relaxation studies performed on these samples it was found that the urethane linkages underwent scission at a rate one-tenth that of the combined rate of the urea and biuret groups.

The relaxation of stress at constant strain had been observed for the polysulfide rubbers. This effect was attributed to interchange reactions occurring amongst the di-sulfide linkages and free mercaptan terminals located on adjacent polymer chains. Such reactions would have remained undetected as long as the samples were maintained in an unstretched condition. Upon the application of a strain these exchange reactions would allow the internal structure to come to equilibrium with the newly imposed dimensions without causing any change in the physical or chemical properties of the system. In this work the effect of curing agents and their reaction products upon the disulfide interchange reaction of cured liquid polysulfide polymers was studied. The curing process involved the oxidation of the mercaptan terminals of the liquid polymer to disulfide linkages or the reaction of these end groups with some polyfunctional reagent. Several different types of cure were attempted on the same batch of liquid polymer including oxidation by metallic oxides, organic peroxides and hydroperoxides, p-quinonedioxime, and catalyzed air oxidation. Cures were also obtained by the use of diisocyanates while attempts utilizing high energy radiation and ozone were unsuccessful. The disulfide interchange was studied by means of stress relaxation. It was found that the rate of exchange was greatly accelerated by the presence of ionic material and excess sulfur. In their absence the exchange reaction proceeded quite slowly. Although the reaction might occur by either an ionic or free radical mechanism, it is believed that the mechanism is predominantly ionic.

A series of mercaptan-terminated liquid polymers was prepared by the successive reactions of a di-isocyanate and dimercaptan with an hydroxy-terminated polyester. Another liquid polymer was prepared by the reaction of the polyester with thioglycolic acid. These were then cured to rubbers by oxidizing the mercaptan terminals to disulfide

linkages. The tensile properties of these materials were found to be intermediate between the conventional polysulfide liquid polymers and the polyurethanes. The chemorheology of these elastomers was studied by stress relaxation.

A series of polysulfide-polyester block copolymers was prepared by the reaction of an isocyanate-terminated polyester "pre-polymer" with polysulfide liquid polymers of varying molecular weight. Stress relaxation studies were performed on these materials. Although several types of linkages were undergoing scission or interchange, it was concluded that at 100°C the combined urethane and isothiourethane groups have nearly three times the stability of the disulfide linkages.

Microfilm \$2.00; Xerox \$4.40. 82 pages.

KINETIC AND MASS TRANSFER STUDIES USING STATIONARY SPHERICAL ELECTRODES

(L. C. Card No. Mic 59-702)

Richard Dale DeMars, Ph.D. The University of Wisconsin, 1959

Supervisor: Assistant Professor Irving Shain

Part I. Analytical Applications of the Hanging Mercury Drop Electrode.

Analytical applications of the hanging mercury drop electrode (a stationary spherical electrode) have been investigated. The reduction of zinc, cadmium, lead, and thallous ions was studied. Voltammetry with continuously varying potential using this new electrode is very rapid and reproducible, and is more sensitive than conventional polarography. The electrode appears to be a useful new analytical tool.

Part II. Anodic Stripping Voltammetry Using the Hanging Mercury Drop Electrode.

Anodic stripping voltammetry using the hanging mercury drop electrode offers a rapid and convenient method for analyzing extremely dilute solutions of metals which form amalgams. The anodic stripping is performed using the techniques of voltammetry with continuously varying potential, and the anodic peak current is a function of the concentration of the ion in the solution and the cathodic plating time. As examples, the method was applied to cadmium and thallous ions in the 10^{-6} to 10^{-9} M concentration range and to mixtures of cadmium and zinc in the 10^{-4} to 10^{-8} M concentration range.

Part III. Voltammetry With Linearly Varying Potential: The Case of Irreversible Waves at Spherical Electrodes.

The theory of voltammetry with linearly varying potential has been extended to the case of irreversible electrode reactions at stationary spherical electrodes. Theoretical current-voltage curves were constructed from the results of calculations which assume a first order electrode reaction occurring at potentials where the rate of the back reaction is negligible. These curves make possible the

determination of the kinetic parameters from an experimental irreversible wave. Effect of variation of any of the experimental parameters was also considered. The theory was checked by comparison with current-voltage curves obtained for the reduction of iodate ion.

Microfilm \$2.00; Xerox \$5.00. 97 pages.

STRUCTURES OF SOME HYDRATED RARE EARTH ETHYLSULFATES

(L. C. Card No. Mic 58-7556)

Donald Robert Fitzwater, Ph.D. Iowa State College, 1958

Supervisor: R. E. Rundle

The hydrated rare earth ethylsulfates, M(C₂H₅SO₄)₃·9H₂O, are of current international interest because of the investigation of crystal field and magnetic effects on the electronic structure of the 4f-subshell. The detailed structural investigation of several of these compounds (Er, Y, Pr) by X-ray diffraction has been carried out.

As was previously reported by Ketelaar, these compounds were found to be isomorphic in the space group $P6_3/m$. Measurement of the lattice constants by a back reflection technique gave results in good agreement with those of Ketelaar. The lattice constants for the erbium compound are a=b=13.915 and c=7.064. The lattice constants for the yttrium compound are a=b=13.924 and c=7.057. There are two molecules per unit cell.

The structures were refined independently by means of a least squares procedure using three dimensional data for the erbium and yttrium compounds and two dimensional data for the praseodymium compound. This refinement produced R_1 values of 10% or lower. The parameters for the erbium compound are given in Table 1.

Table 1. Parameters for Er(C₂H₅SO₄)₃.9H₂O

Atom	Туре	В	X	Y	\mathbf{z}	$\sigma_{\mathbf{x}}$	$\sigma_{\boldsymbol{y}}$	$\sigma_{\mathbf{z}}$
Er	,	1.27	.3333	.6666	.2500	-	-	-
S		2.02	.3191	.3720	.7500	.0003	.0003	-
0	SO ₄	2.83	.2489	.4216	.7500	.0012	.0012	-
0	SO4	2.80	.2289	.2425	.7500	.0012	.0012	-
0	SO ₄	3.43	.3826	.3948	.5780	.0009	.0009	.0019
0	HzO	2.67	.3509	.4947	.2500	.0011	.0011	-
0	H ₂ O	2.72	.2138	.5458	.4868	.0008	.0008	.0017
C	CH ₃	3.95	.1772	.0523	.7500	.0020	.0020	_
C	CH ₃	4.01	.2727	.1693	.7500	.0020	.0020	-

As in the Ketelaar structure, the point symmetry of the rare earth ion is C_{3h}, with nine water molecules about each ion. For the six water molecules forming the trigonal prism about the rare earth ion the Er-O distance is 2.37 Å, and for the three waters in the mirror plane the Er-O distance is 2.52 Å. All sulfate oxygens are much further away (≥4.61 Å). Water oxygens alone provide an environment for the rare earth ion of approximately D_{3h} symmetry. This symmetry is not, however, even approximately followed if the ethylsulfate ions are taken into account.

The praseodymium compound has been given only two dimensional refinement. Assuming the space group remains $P6_3/m$, the R_1 value for the (hkO) data is 9.5%. It seems most unlikely that the Jahn-Teller effect can have destroyed either the mirror plane or the three-fold axis, i.e., the point symmetry at the rare earth ion remains C_{3h} at least within very narrow limits.

Several programs for crystallographic calculations are also described in this work.

· Microfilm \$2.30; Xerox \$8.00. 174 pages.

A POLAROGRAPHIC STUDY OF CHLOROPHYLL AND RELATED COMPOUNDS IN NON-AQUEOUS MEDIA

(Publication No. 20,821)

Sol Gilman, Ph.D. Syracuse University, 1957

Because of the solubility problem, polarographic investigation of the lower-lying redox potentials of chlorophyll had to be conducted in ethanol solvent. The use of a non-aqueous medium for polarography necessitated certain preliminary potentiometric studies, i.e., the calibration of a reference ethanolic half-cell, and of a series of ethanolic buffers, and necessitated also the study of an irreversible alteration of chlorophyll (allomerization) peculiar to its alcohol solutions.

By measurement against each of two reference half-cells, the potential of the ethanolic saturated calomel electrode (E.S.C.E.) was shown to be 0.064 volts relative to the normal hydrogen electrode in ethanol. The E.S.C.E., in turn, was used as a reference half-cell in the calibration of a series of ethanolic buffers (made reversible to a hydrogen electrode), and in the polarographic work which followed.

The rapid spectral alteration and loss of phase test undergone by solutions of chlorophyll in ethanol containing electrolytes, was found to correspond to allomerization, a process which occurs even in pure alcohol at a much slower rate. The speed of reaction and proportion of products formed was shown to be a function of the particular electrolyte present. Structures were suggested for four "allomerized chlorophylls" for which methods of preparation and spectra were presented. Unambiguous methods for detecting partial allomerization, and preventing its occurrence under polarographic conditions, were developed.

The polarographic reduction wave of chlorophyll was found to be little affected by allomerization. Removal of magnesium (yielding pheophytin), however, caused a shift of the half-wave potential (by several tenths of a volt) to more positive potentials. Further alteration of the chlorin free-base, involving successive removal of reducible side-groups caused no large change in the half-wave potential, and hence reduction of uncomplexed chlorins occurs on the macro ring of the dye. Porphyrins not containing reducible side groups, also reduce at approximately the same potentials as chlorins, and hence reduction is on the macro ring here, as well.

The effect of pH variation on the half-wave potentials of uncomplexed porphyrins and chlorins suggest that reduction if initially through a two-electron, two-proton

path. Comparison of the diffusion current constants and positions of the chlorin, porphyrin, and bacteriopheophytin reduction wave suggest that reduction does not follow the porphyrin-chlorin-bacteriochlorin sequence, but that reduction of a porphyrin leads to a porphyrinogen, and of a chlorin to a chlorinogen.

Complexing of a chlorin (pheophytin) to give a phyllin (chlorophyll) shifts the half-wave potential to more negative potentials. Similar shifts were observed for complexing of a porphyrin with Sn⁺⁺, Cu⁺⁺, and Zn⁺⁺ (but not Pb⁺⁺). However, while the pH-dependence of chlorophyll suggests bivalent reduction, that for ZnTPP suggests a complicated reduction mechanism, possibly due to initial reducibility of the complexed Zn⁺⁺. The effect of metal-complexing on the half-wave potential of chlorins and porphyrins serves as an argument for reduction at a carbon-nitrogen site on the macro ring.

Microfilm \$3.15; Xerox \$10.80. 242 pages. Mic 59-928.

THE MICROWAVE SPECTRUM OF PHOSPHORYL DIFLUORO CHLORIDE

(L. C. Card No. Mic 59-710)

Robert John Goll, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor C. Daniel Cornwell

The microwave spectrum of phosphoryl difluoro chloride, POF_2Cl^{35} and POF_2Cl^{37} , has been observed with a Stark modulated microwave spectrograph covering the range of 9.5 to 45 kmc/s. Many Q^b transitions of both isotopes were observed, and measurements were made of members of series with $K_{-1}=4\rightarrow 5$, $5\rightarrow 6$, and $9\rightarrow 10$ of POF_2Cl^{35} , $4\rightarrow 5$, $9\rightarrow 10$ of POF_2Cl^{37} .

From these data, the following rotational parameters were calculated: POF_2C1^{35} , $A-(B+C)/2+10R_6=1890.6261\pm0.0022$ mc/s, $b_p=-0.018195\pm0.000002$, $D_{JK}-12R_5\in-3\delta=2.14\pm0.10$ kc/s, $D_{K}+10R_5\in=-1.43\pm0.10$ kc/s; POF_2C1^{37} , $A-(B+C)/2+10R_6=1962.930\pm0.050$ mc/s, $b_p=0.016626\pm0.000006$, $D_{JK}-12R_5\in-3\delta_{J}\in=1.96\pm0.08$ kc/s, $D_{K}+10R_5\in=-1.88\pm0.10$ kc/s. Here A>B>C are the reciprocal moments of inertia, $b_p=(C-B)/(2A-B-C)$, $\epsilon=-(1/2)b_p$, and centrifugal distortion parameters are given in the notation of Nielsen [Revs. Modern Phys., 23, 90, (1951)].

The quadrupole coupling constants are $(eQq)^{35} = -58.4 \pm 0.5$ mc/s and $(eQq)^{37} = -46.2 \pm 0.2$ mc/s, while $-0.04 < \eta^{35} < 0.14$ and $-0.08 < \eta^{37} < 0.19$. The field gradient, q, refers to the principal inertial axis, <u>a</u>, which nearly coincides with the P-Cl bond.

A method is described for obtaining the dipole moment components from relative intensities measured under conditions of weak field Stark modulation. The a component of the dipole moment was estimated at $\mu_a = \overline{0.44} \pm 0.04D$ using this method.

Studies of nitrobenzene, $C_6H_5NO_2$, and nitrosobenzene, C_6H_5NO , for which no absorption lines were observed in the range 14.0 to 17.4 kmc/s, are described.

Microfilm \$2.00; Xerox \$3.00. 55 pages.

A POLAROGRAPHIC STUDY OF SEVERAL METAL IONS IN N, N-DIMETHYLFORMAMIDE

(L. C. Card No. Mic 58-7254)

John K. Gorman, Ph.D. New York University, 1958

Adviser: Dr. Seymour Z. Lewin

The suitability of N, N-dimethylformamide (DMF) as a polarographic solvent has been investigated. Half-wave potentials and diffusion current constants for a series of metal ions were obtained in 1) 0.20 M lithium nitrate in DMF containing 0.5% water and 2) 0.20 M aqueous lithium nitrate, which provided a direct comparison between the two solvent systems. The following ions were studied: Cu(II), Zn(II), Cd(II), Tl(I), Pb(II), Bi(III), Mn(II), Co(II), Ni(II), Fe(III), H(I) and Cr(III). A reference electrode consisting of a pool of mercury in contact with a solution of 0.10 M mercury(II) nitrate in DMF was employed in the DMF measurements. The preliminary investigation of a suitable reference electrode and supporting electrolyte is described. Additional half-wave potential measurements for Cu(II), Pb(II), Mn(II) and Ni(II) were obtained in 0.20 M lithium chloride in anhydrous DMF against a reference electrode consisting of a mixture of mercury and calomel in contact with a solution of 0.20 M lithium chloride in DMF.

The polarographic properties of the ions studied were found to be generally similar in DMF and water. An approximate, though not exact, parallelism exists between the sequence of half-wave potentials in the two systems and the nature and reversibilities of the ionic reductions are equivalent. Ionic diffusion coefficients in DMF, calculated from the diffusion current data, are, however, significantly smaller than the corresponding aqueous values. An interpretation of the relative ionic mobilities in the two media is made in terms of differences in the effective ionic radii and, alternately, in terms of the Onsager treatment of the relaxation effect. The diffusion current constants and half-wave potentials in DMF are generally independent of the concentration of the reducible ion as prescribed by the Ilkovic equation and the electrode processes are diffusion-controlled in all cases. Several different types of polarographic maxima are observed in DMF and a number of generalizations concerning their occurrence are discussed.

The difference between the half-wave potentials, $\Delta E_{\frac{1}{2}}$, obtained in DMF and water was evaluated for each ion. The fact that these differences are generally similar for the reversibly reduced ions suggests that a non-specific interaction of the ions with DMF is involved rather than the formation of definite complexes. However, the existence of comparatively stable chloride complexes for Zn(II), Cd(II), Co(II) and Cr(III) ions in DMF is evidenced by the absence of reduction waves for these ions when lithium chloride rather than the nitrate is employed as the supporting electrolyte. The $\Delta E_{\frac{1}{2}}$ values are discussed in terms of a primary solvation effect, using the Born equation.

Ionic diffusion coefficients in the DMF-lithium nitrate medium were also measured by 1) the open-ended capillary method for Zn(II), Cd(II), Tl(I) and Co(II) ions, employing radioactive tracers and 2) a modified diaphragm-cell method for Cd(II), Tl(I), Pb(II), Bi(III) and Ni(II) ions.

The capillary and polarographic values were in fair agreement with one another, both being considerably lower than the diaphragm-cell values. From an analysis of the systematic errors inherent in each of the methods it is concluded that the diaphragm-cell values are excessively high. It is further concluded that the polarographic and capillary values are about equally reliable and that the diffusion current data in DMF are adequately described by the Ilkovic equation.

The results of this research support the general conclusion that polarography in DMF is not fundamentally different from aqueous polarography, and that results and interpretations derived from aqueous studies can be extrapolated to DMF with reasonable safety. This should permit much useful research into organic oxidation-reduction systems because of the generally favorable solubility characteristics of DMF.

Microfilm \$2.50; Xerox \$8.80. 191 pages.

PART I: FLOW MECHANISM OF LUBRICANTS UNDER PRESSURE. PART II: A THEORY OF THIXOTROPY AND ITS APPLICATION TO GREASE. PART III: THEORY OF STRESS RELAXATION

(L. C. Card No. Mic 58-2758)

Sang Joon Hahn, Ph.D. University of Utah, 1958

Chairman: Henry Eyring

Part I

The flow properties of lubricating greases and oils are described in terms of two kinds of flow units: Newtonian and non-Newtonian units. The increase in viscosity and non-Newtonian character with pressure are explained by the following two assumptions: (1) The transition, Newtonian unit — non-Newtonian unit, is induced at high pressures. (2) The relaxation time increases with pressure. By introducing the above ideas into the Ree-Eyring theory of non-Newtonian flow, a new flow equation is derived, which is successfully applied to the flow of lubricants.

Part II

We assume that there are two kinds of flow units in a flow system, i.e., non-Newtonian (entangled) and Newtonian (disentangled) units. The non-Newtonian units transform into the Newtonian by a stress. Two cases exist: (1) the transformation is in a kinetic equilibrium; (2) it is irreversible. In case (1), the concentrations of flow units are independent of time, while the concentrations in case (2) are time-dependent. The idea of the transformation is introduced into the Ree-Eyring theory of non-Newtonian flow, and two flow equations corresponding to case (1) and (2) are obtained. "The Ostwald flow curve" is explained by the flow equation for case (1), whereas "the thixotropy curve" is well described by the equation for case (2). The theoretical flow equations are applied to the experimental flow curves of the following systems: rubber dissolved in toluene, nitrated American raw cotton dissolved in butyl

acetate, nitrated pine pulp in butyl acetate, melted sulfur, gelatine sol, melted cholesteryl butylate, and Grease S. Except for Grease S, which is thixotropic, all the systems show good Ostwald curves. The agreement between theory and experiment is satisfactory.

Part III

Stress relaxation can be treated as a unimolecular reaction, the rate of which is given by

$$-\frac{dn_f}{dt} = k_f n_f (e^{\mu \lambda F/kT} - e^{-(1-\mu)\lambda F/kT})$$
 (a)

Here, n_f is the number of relaxation sites, k_f is the specific rate for the forward reaction, F is the force acting on a relaxation site, λ is the distance between two minima in the potential curve for the reaction, and μ has the value, 1/2, when the potential barrier is symmetrical. F is assumed to be proportional to n_f . The latter is again assumed to be proportional to the force, f, which one measures. Thus, the rate of relaxation is represented as

$$-\frac{d \ln f}{dt} = k \left(e \alpha_1 f - e^{\alpha_2 f}\right)$$
 (b)

where, $\alpha_1 = \mu \lambda \lambda_2 \lambda_3/kT$, $\alpha_2 = (1 - \mu)\lambda \lambda_2 \lambda_3/kT$, and $\lambda_2 \lambda_3$ is the cross-sectional area of the site. Equation (b) is applied to the stress relaxations in wool fibres and isobutylene polymers with good results. The relaxation in wool (at 15 per cent. elongation and 30-80°C in water) is characterized by a high activation heat (45.3 kcal/mole) and high positive activation entropy (44.9 cal/deg/mole) while a reasonably low activation heat (13.3 kcal/mole) and high negative activation entropies (-31.4 to -46.3 cal/deg/mole) are associated with the relaxation in isobutylene polymers. The relaxation in wool is explained by the α - β transition, and that in polyisobutylene by the slippage accompanying disentanglement. A detailed discussion is given for the assumptions mentioned above.

Microfilm \$2.00; Xerox \$5.60. 110 pages.

A CONTRIBUTION TO THE MECHANISM OF THE ACIDIC, BASIC, AND ENZYMATIC HYDROLYSIS OF THE PEPTIDE BOND BY KINETIC STUDIES AT HIGH PRESSURE

(L. C. Card No. Mic 58-7444)

Jerry William Harlan, Ph.D. University of Missouri, 1958

Supervisor: A. E. Stearn

The volume, enthalphy, and entropy of activation for the alkaline hydrolysis of acetylglycine were found to be -17.6 cm³ per mole, 16.5 kcal. per mole, and -31.2 E.U. per mole at 59.6°C., in a standard state equivalent to infinite dilution. The volume and entropy of activation, at 59.6°C., for the acid hydrolysis of acetylglycine were found to be -14.5 cm³ per mole, and -16.9 E.U. per mole.

The measurements were made in solutions of twotenths ionic strength and corrected to the standard state by application of electrostatic theory. The effects of pressure and concentration on activation volumes are discussed.

The electrostatic properties of the alkaline activated complex are shown to approach those of a divalent anion.

These data, together with data in the literature, support the general mechanism of catalysis of the hydrolysis of a peptide carbon-nitrogen bond by a solvent hydroxyl group proposed by Stearn, in which the catalytic effect is produced by polarization of the bonds in the activated complex, and lead to the postulate, that the volume of activation for the hydrolysis, by a solvent hydroxyl group, of a peptide bond activated by enzyme substrate complex formation

should be between -6 and -17 cm³ per mole.

The volumes of activation of 16 to 20 cm³ per mole, found for the first complex formation step, and less than -20 cm³ per mole, found for the second rate controlling step in the hydrolysis of carbobenzoxyglycyl-1-phenylalanine by carboxypeptidase, support the mechanism for this reaction proposed by Ronwin,² in which the first step is the formation of a chelate ring with charge neutralization, and the second rate controlling step is the formation of a second ring, involving multiple hydrogen bonding of a water molecule, to create a dipositive bond, rather than the hydrolysis of the peptide bond by the direct attack of a solvent hydroxyl group.

Preliminary experiments showed the hydrolysis of acetylglycine by hippuricase, prepared by the method of Ito,³ from Penicillium notatum myceliums, to be first order with respect to substrate in 0.015 to 0.10 molar solutions rather than zero order as suggested by data in the litera-

ture for similar substrates.

The rates of hydrolytic reactions were obtained by measuring the alpha amino acids liberated after various time intervals, by the colorimetric ninhydrin method of Moore and Stein.

The apparatus used in these experiments, and constructed for kinetic measurements at pressures up to 20,000 pounds per square inch over a zero to one hundred degree centigrade temperature range, is described.

Microfilm \$2.10; Xerox \$7.40. 157 pages.

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 - 2. Ronwin, E., Enzymologia, 16, 81-6 (1953).
 - 3. Ito, Yuki, J. of Biochem. (Japan), 37, 51-63 (1950).
- 4. Moore, S., and Stein, W. H., J. of Biol. Chem., 176, 367-88 (1948).

METAL EXTRACTION CHARACTERISTICS OF CERTAIN CARBOXYLIC ACIDS

(L. C. Card No. Mic 59-30)

John Frederick Hedenburg, Ph.D. University of Pittsburgh, 1958

The object of this study was to describe the extraction of metals into organic solvents by carboxylic acids in terms of the distribution properties of the acids, so that the effect of acid structure upon metal extraction can be predicted.

A selected group of carboxylic acids were screened as possible agents for extracting metals into organic solvents. The acids were judged on their ability to extract in a variety of solvents. From this work a series of eight carbon atom acids were chosen to be studied in greater detail. These acids were 2-ethylhexoic, 2-ethylisohexoic, 2-ethylhex-2-enoic, 2-ethyl-3-hydroxyhexoic, n-caprylic, and phenylacetic. The solvent picked for this study was chloroform.

The dissociation constants, Ka, of the six acids were determined and were found to agree with known values as far as these are available.

For the system, chloroform-aqueous buffer, values of the distribution coefficient, K_d , and the dimerization constant, K_p , were determined. They have been correlated with similar data in the literature. The relationships of these constants and the dissociation constant to the structures of the several acids have been explained in terms of hydrogen-bonding, solvent dielectric constant, and steric hindrance.

The distribution characteristics of copper and iron in systems containing the organic acids and chloroform or amyl alcohol have been studied. The lambda shaped extraction curves obtained have been explained, in the cases of unhydroxylated systems, by the extraction of the normal soap. A mathematical analysis has yielded an equation which predicts the extraction curve, including the pH of the maximum. This value, called pHd, was shown to occur at the pH where the organic acid concentration was the same in both phases. The variation of extraction with initial acid concentration was also predicted as was that with change in the volume ratio of the phases. The distribution ratio was found to be independent of metal concentration. Values of $K_{dm}\,K_f$, the metal distribution coefficient and the formation constant of the normal soap, have been determined. From these values it may be seen that iron can be separated from copper in a one-stage extraction by 2ethylhexoic acid.

Microfilm \$2.00; Xerox \$4.80. 91 pages.

EQUILIBRIUM IN THE REACTION OF BARIUM WITH CALCIUM CHLORIDE

(L. C. Card No. Mic 58-7557)

John Arnold Hinkebein, Ph.D. Iowa State College, 1958

Supervisor: David Peterson

The reaction of barium with CaCl₂ was investigated by determining the Ba-CaCl2 ternary system. Isotherms at 900°C and 950°C were determined by heating calcium and BaCl₂ or barium and CaCl₂ in stainless steel capsules, quenching in water and analyzing the phases. The results were reported as isothermal tie-lines and as concentration quotients (C). C was independent of concentration between 0 and 90 mole percent BaCl₂ with valves of 116.5 and 82.3 at 900°C and 950°C respectively. C at 950°C decreased to 40.5 at 98.5 mole percent barium. The solubility of the metal in the salt was 4.2, 3, 4.2, and 21 mole percent for 0, 45, 90, and 100 mole percent BaCl₂ respectively. The observed solubility of the metal in the salt was compared with solubilities calculated by making assumptions as to how the metal dissolves or exists in the liquid salt. Five models were considered: (1) monochloride

monomers, (2) monochloride dimers, (3) each metal dissolved according to Henry's law, i.e., mole fraction of metal A dissolved in the salt was equal to a constant times the mole fraction of A in the metal phase, (4) the mole fraction of metal A dissolved in the salt was equal to a constant times the product of the mole fraction of A in the metal phase and the mole fraction of ACl2 and (5) barium dissolved according to model 3 and the mole fraction of dissolved calcium was equal to a constant times the product of the mole fraction of calcium in the metal phase and the sum of mole fraction of CaCl2 plus an arbitrary constant times the mole fraction of BaCl2. This arbitrary constant was evaluated from one value of the ternary solubility. The equilibrium constants for the formation of the monochlorides and the Henry's law constants were evaluated from the binary solubilities. With the exception of (1), all of the models qualitatively predicted the ternary solubility. The best agreement with the observed solubilities and the equilibrium constant which was most nearly independent of concentration was obtained with (5).

Thermal analysis was used to determine phase boundaries in the ternary system and to check the reported binary systems. In the Ba-BaCl₂ system, the consolute point was 1017°C and 50 mole percent barium, the monotectic was at 890°C and 15 mole percent barium, and the eutectic was at 768°C and 96 mole percent barium. In the Ca-CaCl₂ system, the monotectic was at 820°C and 99 mole percent calcium, the eutectic was at 768°C and 1.5 mole percent calcium, and the boundaries of the immiscibility gap rose steeply to 5 and 97.5 mole percent calcium at 1025°C. In the BaCl₂-CaCl₂ system, the eutectic was at 595°C and 37 mole percent BaCl₂. The compound CaCl₂-BaCl₂ melted incongruently at 625°C.

In the ternary, the monotectic was raised from 890°C in the Ba-BaCl₂ binary to 914°C at 5 mole percent calcium and 5 mole percent metal. It then dropped to the ternary eutectic at 593°C and 1.6 mole percent metal and 37 mole percent calcium.

Assuming that C was equal to K in the region of low solubility, ΔF^0 for the reaction was equal to -11.1 and -10.7 k cal at 900°C and 950°C respectively and ΔH^0 was equal to -19.9 k cal.

Microfilm \$2.00; Xerox \$4.60. 86 pages.

POLYMERIZATION OF DIENES BY MEANS OF METALLIC LITHIUM AND LITHIUM ALKYLS

(L. C. Card No. Mic 58-7850)

Henry Lien Hsieh, Ph.D. Princeton University, 1957

The history of the preparation of polyisoprene and the determination of the structure of diene polymers is briefly reviewed.

The infrared technique for the structure determination of polyisoprene has been used throughout the investigation. Discussion, consisting of a description of the equipment, actual operation, procedure and calculations which have been carried out in this laboratory is presented. Numerous infrared spectra are included and the reliability of this method is discussed.

In order to study the polymerization of dienes initiated

by lithium alkyls, it is necessary to prepare the organolithium compounds in pure form and in different solvents. General methods for preparation of lithium alkyls are first discussed and then the experimental procedures for the synthesis of n-butyl lithium, n-amyl lithium, iso-amyl lithium and tert-butyl lithium in diethyl ether as well as the synthesis of n-butyl lithium in benzene are presented. In addition, those precautions necessary for the handling of these reactive organo-lithium compounds are mentioned.

The effects of temperature, solvents and nature of the lithium catalyst for the polymerization of isoprene have been investigated and clear evidence is presented that "natural" rubber can be synthesized in the laboratory by using metallic lithium as catalyst. The rate of lithium initiation is influenced by the purity of the components, the total surface area of the catalyst and the polymerization temperature. The macrostructure of the lithium-catalyzed polymer is independent of polymerization temperature and type of hydrocarbon solvent. It appears that the polymerization of isoprene initiated by metallic lithium in bulk or hydrocarbon solvents proceeds on a solid surface.

The relationship between the macrostructures of the n-butyl lithium-catalyzed polymers and the polymerization temperatures, monomer/solvent ratios and the type of solvent used are quantitatively characterized. The striking difference of polymer structures prepared between apparent homogeneous and heterogeneous systems is clearly demonstrated.

Under the same polymerization conditions, the infrared spectral properties of polyisoprenes catalyzed by n-butyl lithium, n-amyl lithium and iso-amyl lithium are, roughly speaking, similar. It appears the organic moiety of the catalysts plays only a very minor role in directing the steric course of the polymerization.

Tetrahydrofuran has also been studied as a solvent. The data supported the accumulating evidence pertaining to the directive effect of solvents in organo-metallic reactions.

Polybutadiene having 95 per cent 1,2- structure is synthesized by means of iso-amyl lithium as a catalyst at low temperature.

Similar polymer structure has been observed among the polyisoprenes prepared by means of metallic lithium and lithium alkyls in tetrahydrofuran. This appears to be a strong argument that both catalysts have some intermediate in common: perhaps the lithium metal first forms an alkenyl with the isoprene.

Lithium alkyl/TiCl₄ as a diene polymerization catalyst and TiCl₄ as a diene polymerization catalyst in different solvent systems are studied. The properties of these polymers are discussed.

From a cyclization experiment, it is clearly demonstrated that, in spite of the fact that BF₃ and SnCl₄ are known to be cyclizing agents, TiCl₄ does not cause cyclization of natural rubber under the conditions tested.

Microfilm \$2.00; Xerox \$4.00. 72 pages.

CHEMICAL ASPECTS OF MOLECULAR COLLISIONS

(L. C. Card No. Mic 59-714)

Donald William Jepsen, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor Joseph O. Hirschfelder

In the first part of this thesis a general method is given for calculating the coupling between the nuclear and electronic motion in the hydrogen molecule ion using the exact wave functions. Calculations are carried out for the transition $1s\sigma_g-2s\sigma_g$ and compared with values obtained from simple approximate methods. Using these results, an estimate is made of the cross section for transition from $1s\sigma_g$ to $2s\sigma_g$ in collision and compared with other results. Finally it is shown that a Born-Oppenheimer separation carried out in relative coordinates should be slightly more accurate than the usual treatment.

In part 2 of this thesis a simple method is given for following the collision dynamics of 3 potential well molecules restricted to move on a line. The method can be applied to similar simple potentials which involve rigid core repulsion. Next an expression for the reaction rate for the recombination of atoms is derived in terms of the total flux of trajectories across the Eyring surface from reactants to products. The rate is calculated for atoms which interact according to a potential similar to the potential well model. Finally, the simple reaction $A + B \longrightarrow AB + C$ is studied by similar methods.

In part 3 we describe a general method of assigning relative coordinates to a system of particles and separating off the motion of the center of mass so that the kinetic energy comes out in diagonal form, thus avoiding cross derivatives in the Schroedinger equation. We show that such coordinates can be defined in a number of different ways each of which can be visualized by a certain "mobile model." With the mobile model in mind, the Schroedinger equation can be written down in the corresponding coordinates without calculation.

Microfilm \$2.05; Xerox \$7.20. 153 pages.

INITIATION-INHIBITION RELATIONSHIPS IN STYRENE POLYMERIZATION

(L. C. Card No. Mic 58-7577)

Richard Taylor Keys, Ph.D. Iowa State College, 1958

Supervisor: George S. Hammond

The kinetics of initiated styrene polymerization were studied as a function of monomer concentration at 70.0° by the use of precision dilatometry. Rates of polymerization were measured, and in the case of experiments with added inhibitors, inhibition periods, 7, were determined. Two initiators were used in this study, azo-bis-isobutyronitrile (ABN) and dimethyl-N-(2-cyano-2-propyl)-ketenimine (RR'). The rate of decomposition of ABN was determined manometrically by nitrogen evolution and the rate of decomposition of RR' was determined by quantitative infrared anal-

yses. The efficiency of these two initiators was measured in carbon tetrachloride at 62.5° by the manometric measurement of inhibition periods produced by di-t-butyl-p-cresol in the autoxidation of cumene. The inhibitors chloranil (I), 2,5-dichloroquinone (II), 2,6-dichloroquinone (III), and diphenylpicrylhydrazyl (DPPH) were used in this investigation. The following results were obtained:

The ratio of the initiator efficiency, a, to the inhibitor stoichiometry, q as calculated from Equation 1 was found to increase with increasing monomer concentration for the inhibitors I, II, and III. The increase was largest with III. The increase with I and II was roughly the same. The large increase in III is ascribed to the fact that III does copolymerize appreciably with styrene.

(1)
$$q(In)_o = 2a(I)_o(1 - e^{-k_i \tau})$$

While Equation 2 gave an excellent fit to the dependence of the rate of polymerization on the concentration of the initiator, RR', Equation 2 does not give a good fit for the dependence of the rate on the monomer concentration in styrene-benzene mixtures. This result is in good agreement with previous work. If one assumes that \underline{a} is a function of monomer concentration, the variation is roughly of the same magnitude as the variation of the ratio $\underline{a}/\underline{q}$ calculated for II and III.

(2)
$$R_P = \frac{k_P a^{\frac{1}{2}} k_i^{\frac{1}{2}} (I)^{\frac{1}{2}} (M)}{k_t^{\frac{1}{2}}}$$

The ratio of <u>a</u> for RR' to <u>a</u> for ABN in pure styrene is 0.80 as calculated by Equation 2. On the other hand, the same ratio from autoxidation experiments in carbon tetrachloride is 0.64.

The initial fraction of ABN which goes to RR' (as measured by quantitative infrared analysis) upon decomposition of ABN is considerably lower in styrene (0.30) than in benzene (0.72).

The rate of decomposition at 70.0° of ABN in benzene is 4.25×10^{-5} , and in styrene is 4.54×10^{-5} sec.⁻¹. On the other hand, the dependence of the rate of decomposition of RR' on monomer concentration in benzene solution is much greater: M = 0.0, $k = 3.92 \times 10^{-5}$; M = 2.59, $k = 5.41 \times 10^{-5}$; M = 5.79, $k = 6.31 \times 10^{-5}$; M = 8.28, $k = 6.22 \times 10^{-5}$ sec.⁻¹.

These results indicate that the efficiency factor, a, changes with monomer concentration. A proposal is advanced that monomer may complex with radicals from the decomposition of the initiator thereby to decrease the importance of cage effects.

Microfilm \$2.45; Xerox \$8.60. 186 pages.

THE EFFECTS OF LOW ENERGY X-RAYS ON ORGANIC GASES AND ON ORGANIC GAS - NOBLE GAS MIXTURES

(L. C. Card No. Mic 58-5279)

Richard Carl Palmer, Ph.D. Vanderbilt University, 1958

Supervisor: Professor Dwight C. Bardwell

Radiation chemistry is concerned with the chemical effects of ionizing radiation upon matter. The present study involved the irradiation of gases with low energy x-rays (< 50 kv), the suitability of which for this purpose has not been reported elsewhere. The decision to make this investigation was prompted by the knowledge that relatively few reports are being made on gas phase work even though it is important that gas phase behaviors be established concurrently with those of liquids and solids.

It was found that Vanderbilt's 50 Kvp - 50 Ma X-Ray Unit, which employs a Machlett OEG-60 X-Ray Tube (1 mm thick beryllium window), would polymerize a 700 mm charge of acetylene at the rate of one per cent per hour, a rate sufficient for experimentation. This corresponded to an energy absorption of about 6 x 10¹⁹ electron volts (ev) of energy per hour, which compared favorably with doses obtainable from radon and from electrons or ions from an accelerator. However, these sources of ionizing radiation are not readily available. Furthermore, gamma rays from a Co-60 source are not suitable for vapor phase work since they are too penetrating. In view of these considerations, the use of low energy x-rays should greatly stimulate more widely represented investigations of vapor phase behavior.

To further demonstrate the applicability of the unit, a study was made of a number of unsaturated organic compounds. Unsaturated substances were chosen since they exhibited the simplest behavior in alpha ray work. The results obtained by the radiolysis of pure gases in this investigation are compared with alpha ray results in Table 1.

TABLE 1
EXPERIMENTAL G VALUES

Compound	Literature*	Present Work
Ethylene	18.9	28.7
Propylene	18.2	20.3
1-Butene		20.0
2-Butene	14.0	10.0
1,3-Butadiene	35.6	37.6

*G values were obtained by using the M/N values given in Thesis and the W value of 26.7 ev/ion pair for ethylene.

The relation between effects and energy input is currently expressed in terms of the "G value," the number of molecules reacted or formed per 100 ev absorbed. In the earlier gas phase work the results were reported in terms of the "M/N value," the number of molecules reacted or formed per ion pair generated in the system. Acetylene, for which the G value of 72 (M/N of 20) has been well established by alpha ray work, was used for a calibration dosimeter in much the same way as ferrous iron oxidation in aqueous solution is employed.

Within the reproducibility established thus far in the work, there does not appear to be any temperature dependence of the G value between 17°C. and 85°C. The literature G value for ethylene appears to be low as it is identical to that of propylene. While previous investigators failed to indicate whether they used the <u>cis</u> of <u>trans</u> butene, <u>cis-2-butene</u> was used in this investigation. Thus, only a qualitative comparison can be made.

Another phase of this investigation was to study the effects of adding noble gases to the irradiation system. In alpha ray work an additive effect in the order of one to one was observed. In the present study, rates of polymerization increased greatly. Analysis of the data is based on the assumption that the amount of polymerization caused by energy absorption in the noble gas and the amount of polymerization caused by energy absorption in the acetylene are additive. The amount of polymerization per unit time due to acetylene can be calculated for a given mean pressure by multiplying the rate constant for pure acetylene by that mean pressure. The amount of polymerization due to the noble gas can be calculated by subtracting the pressure drop due to acetylene alone from the total pressure drop observed. The rate coefficient, designated by K', for the noble gas can now be found by dividing the change in pressure due to the noble gas by the pressure of the noble gas. The rate coefficients of the noble gas are now divided by the rate constant for pure acetylene. At high mole ratios of acetylene, the K'noble gas/KC2H2 values are essentially constant, but at low mole ratios of acetylene the values drop off rapidly.

Table 2 is a summary of the results of the radiolysis of the acetylene - noble gas mixtures and the 1, 3-buta-diene - noble gas mixtures, which were used as a cross check.

TABLE 2
SUMMARY OF THE LIMITING VALUES OF
K'noble gas/Korganic gas

Noble Gas	Acetylene	1,3-Butadiene
Helium	0	
Neon	5	
Argon	30	14
Krypton	60	28
Xenon	148	75

The comparative behaviors of acetylene and 1, 3-buta-diene, accelerated by admixture of argon, are in agreement with calculations which were made from the published data on the attenuation coefficients of argon, hydrogen, and carbon in the 50 kv energy range. This agreement indicates that the process for converting the energy absorbed by the noble gas to a chemical effect is efficient at high ratios of the reacting gas to noble gas. It follows that the attenuation coefficients for neon, krypton, and xenon can be calculated from the accelerating data in Table 2 and the published data on carbon and hydrogen or argon.

Besides the scientific implication of the accelerating effects of noble gases, there is the advantage of increasing the rate of a reaction. The increased rate of reaction will allow substantially complete conversion of the reacting gas to a product or products. For example with 100 mm of

xenon added to 700 mm of acetylene at room temperature, 676 mm of acetylene were polymerized to cuprene in two and one-half hours, whereas pure acetylene polymerized at the rate of 10 mm per hour.

Microfilm \$2.00; Xerox \$4.00. 74 pages.

THE ACCOMMODATION COEFFICIENTS OF HELIUM, NEON, AND ARGON ON CLEAN POTASSIUM AND SODIUM SURFACES FROM 77° TO 298°K, AND A STUDY OF ADSORPTION OF POTASSIUM ON TUNGSTEN

(L. C. Card No. Mic 58-7448)

Howard Lee Petersen, Ph.D. University of Missouri, 1958

Supervisor: Lloyd B. Thomas

The thermal accommodation (AC) is a quantity used to express the efficiency of energy transfer at a gas-solid interface. It is defined as the ratio of the observed energy transfer to the energy which would be transferred if the gas reached thermal equilibrium with the solid. The AC is generally determined by measuring the heat conducted away from an electrically heated filament by a gas at a low pressure.

The AC of helium, neon, and argon on clean surfaces of potassium and sodium were measured at temperatures of 77°, 90°, 195°, and 298° K. The potassium and sodium surfaces were produced by the evaporation of the metal onto a supporting tungsten filament. Sodium was evaporated from the wall of the tube which contained the filament. Potassium was evaporated from the tube wall in some experiments and from an auxiliary filament in others.

AC VALUES OF INERT GASES ON CLEAN METAL SURFACES

	77°K	90°K	195°K	298°K
He on K	.0419	.0436	.0712	.0826
He on N	la .0363	.0389	.0641	.0895
Ne on K	.0745	.0839	.1557	.1987
Ne on N	la .0585	.0645	.1204	.1977
A on K	.4095	.3930	.4612	.4443
A on N	Ta .4340	.3938	.4345	.4594

The variation in the AC with temperature observed for the alkali metals in this work is different from that observed for tungsten by Silvernail. He found that the AC of helium decreased with decreasing temperature, the AC of neon went through a slight minimum at 190° K, and the AC of argon increased with decreasing temperature.

Since the adsorption of gas impurities on the surface of the metal strongly affects the value of the AC, it is necessary to take considerable care to insure that the surface is clean. The AC measured on bulk potassium and sodium showed consistently the same values upon repetition of experiments, and the AC on a given surface showed no variation over a period of 24 hours. In view of these facts and the behavior of the system upon the addition of hydrogen and oxygen, it is considered that the AC measurements

reported in this work are characteristic of the bare metal surfaces.

Measurements of the AC of helium on potassium in the vicinity of its melting point were made. It was found that the AC increased slightly at the melting point of the solid, but no sharp discontinuity was observed.

The adsorption of potassium on tungsten was studied by means of its influence on the AC of helium. In the presence of saturated potassium vapor, the AC of helium on a tungsten filament increased from a value of 0.060 shortly after the filament had been flashed to a constant value of 0.097 after 2 hours. For these values the filament was maintained about 3 degrees hotter than the bath. An increase in the filament temperature decreased the AC so that at a ΔT of 25 degrees the AC was about 0.060. The variation in the AC with ΔT showed a slight hysteresis, but was nearly reversible. This variation with ΔT is attributed to acquisition at low △T of several layers of potassium thus approaching the characteristic AC value of bulk potassium, and reduction of the adsorbed potassium to a more firmly held first layer of potassium at higher ΔT. Microfilm \$2.00; Xerox \$7.00. 148 pages.

CHEMICAL EFFECTS OF NEUTRON CAPTURE BY CHLORINE IN ALKYL CHLORIDES

(L. C. Card No. Mic 59-726)

John Edward Quinlan, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor John E. Willard

The purpose of this work was to learn something of the mechanisms of the chemical reactions of halogen atoms activated by nuclear processes by determining the identities and yields of organic Cl^{38} compounds resulting from activation of chlorine atoms by the $\text{Cl}^{37}(n, \gamma) \text{Cl}^{38}$ process in the presence of alkyl chlorides and of alkanes in the vapor phase.

The organic yield (i.e. the fraction of Cl³⁸ atoms which became stabilized in organic combination) was determined from the distribution of radioactivity between an organic solvent and aqueous sulfite solution which were used to extract the neutron irradiated vapor. The identities and relative amounts of organic products containing Cl³⁸ were determined by gas chromatography, using a scintillation counter for detection of the radioactive species.

The organic products containing Cl³⁸ following neutron irradiation of both liquid and vapor alkyl chlorides included the parent compound, compounds with shorter carbon chains, compounds formed by replacement of hydrogen atoms by Cl³⁸, unsaturated organic chlorides, and compounds with longer carbon chains than the parent alkyl chloride. The relative amounts of individual products were different in the liquid than in the vapor phase. From ethyl chloride vapor the products in order of decreasing abundance were: ethyl chloride, 1,2-dichloropropane, methylene chloride, methyl chloride, vinyl chloride, ethylene chloride, ethylidene chloride, 1,3-dichloropropane, n-propyl chloride and s-butyl chloride.

Mixtures of HCl with alkanes yielded the same products as those from alkyl chlorides, with the exceptions that almost no dichloroalkanes and no high yield chain lengthened products were formed. Mixtures of methyl chloride with alkanes showed high yields of chain lengthened products, however. For example, n-propyl chloride was observed from a methyl chloride-ethane mixture. Addition of oxygen or 0.1 mole percent iodine almost completely eliminated these chain lengthened products but had little effect on most other products.

The organic yields found for alkyl chlorides in the vapor phase were: methyl chloride, 21%; ethyl chloride, 7%; i-propyl chloride, 9%; n-propyl chloride, 10%; t-butyl chloride, 17%; and carbon tetrachloride, 26%. The organic yields of vapor phase mixtures of HCl and alkanes varied in about the same way as the corresponding alkyl chlorides but the yields were somewhat lower in each case. One to two mole percent HCl lowered the organic yield from n-propyl chloride vapor to 6% and from ethyl chloride to 4% without significantly affecting the relative yields of individual products. Ethylene at a concentration of 0.1 mole percent had no effect on the organic yield from n-propyl chloride vapor. The yield of a 13 to 1 mixture of neon and n-propyl chloride was 2% and that of a 3 to 2 mixture of oxygen and n-propyl chloride was 3%.

The unusual reactions of Cl³⁸ atoms observed in this work appear to depend solely on the unique activation of the atoms as born from the nuclear process and to be independent of the fact that exposure to ionizing radiation accompanies the exposure to neutrons.

The results indicate that the Cl³⁸ atoms are able to replace atoms and radicals in organic molecules by hot bimolecular reactions. High kinetic energy or electronic excitation are believed responsible for these unique reactions. Secondary reactions which could form the unsaturated and chain lengthened products are discussed.

Microfilm \$2.05; Xerox \$7.20. 154 pages.

THE CALCIUM-STRONTIUM PHASE SYSTEM

(L. C. Card No. Mic 58-7238)

John Charles Schottmiller, Ph.D. Syracuse University, 1958

Supervisor: Frank A. Kanda

The Calcium-Strontium phase system was investigated by differential thermal analysis and by X-ray diffraction methods, both at room temperature and elevated temperatures, over the entire range of composition from 100% Ca to 100% Sr.

The calcium metal used for this study was of "chemical standards grade" quality and was found to melt at 842°C. The strontium metal, also of high purity, was initially found to melt at 765°C, but after vacuum distillation the melting point was raised to 774°C.

In the thermal analysis, the alloys were prepared by fusing together accurately weighed quantities of calcium and strontium in steel crucibles which could be air-evacuated and subsequently filled with argon to prevent oxidation of the hot samples. The crucibles were heated in a globar furnace for which heating and cooling rates were controlled. Temperatures were obtained through a chromel-alumel thermocouple and recorded by a variable range Brown

Electronic Recorder. Data were recorded in two ways: time vs. temperature and time vs. temperature differential.

The X-ray diffraction portion of the investigation was done principally with a Debye-Scherrer type high temperature camera which was calibrated for temperature by the visual observation of the melting points of a series of salt samples in the camera. Samples for high temperature X-ray diffraction were prepared in a pyrex or vycor capillary free from contact with air. High temperature X-ray data were supplemented by room temperature photograms.

Thermal analysis showed that calcium and strontium display complete solid solubility with a minimum in the liquidus-solidus at 78 ± 2 weight percent strontium and at a temperature of 738 °C.

Chemical analysis of the alloys was made at intervals to check the make-up analyses.

Room temperature X-ray diffraction data showed that alloys of Ca and Sr crystallize in the face-centered cubic form over the entire range of compositions. Calcium was found to have an a_0 value of 5.601 \pm .0015 A.U., and strontium an a_0 value of 6.084 \pm .002 A.U. The variation of a_0 with atomic percent at room temperature in Ca-Sr alloys was found to be linear in conformity with Vegard's law.

High temperature X-ray diffraction studies showed that Ca, Sr, and all Ca-Sr alloys exist in three crystalline modifications, face-centered cubic, hexagonal close-packed, and body-centered cubic.

In pure calcium the transition F.C.C. \rightarrow H.C.P. occurs at 344 $\pm 5^{\circ}$ C., and in pure strontium at 230 $\pm 5^{\circ}$ C. In all alloys of Ca and Sr this transition occurs at temperatures intermediate to the transition temperatures of the pure components.

The H.C.P. \rightleftharpoons B.C.C. transition occurs at 610 \pm 6°C. in pure Ca and at 621 \pm 6°C. in pure Sr. Solution of Ca in Sr and Sr in Ca lowers these transition temperatures until a minimum is reached at about 53 weight percent strontium and at a temperature of 510 \pm 5°C.

The B.C.C. form of Ca at 615° C. was found to have an $a_0 = 4.488 \pm .005$ A.U., and the B.C.C. form of Sr an $a_0 = 4.87 \pm .02$ A.U. at 630° C. The plot of a_0 vs. atomic percent for B.C.C. alloys shows positive deviation from Vegard's law in the Sr-rich alloys.

The H.C.P. form of Ca at 415° C was found to have an $a_0 = 4.00 \pm .02$ A.U., and a $c_0 = 6.50 \pm .02$ A.U., with a c:a ratio of 1.63. The H.C.P. form of Sr at this temperature was found to have an $a_0 = 4.33 \pm .02$ A.U., and a $c_0 = 7.05 \pm .02$ A.U. with a c:a ratio of 1.63.

The variation of both a_o and c_o with atomic percent at 415°C. is linear in calcium rich alloys, but positive deviation from Vegard's law occurs in the Sr-rich alloys.

Microfilm \$2.00; Xerox \$5.80. 118 pages.

RATE OF SOLVENT EXTRACTION: NITRIC ACID AND URANYL NITRATE WITH TRIBUTYL PHOSPHATE AS THE EXTRACTING AGENT

(L. C. Card No. Mic 58-7594)

Russell Paul Wischow, Ph.D. Vanderbilt University, 1958

Supervisor: Professor K. Keith Innes

A technique was developed to study the rate of extraction of nitric acid and uranyl nitrate from an aqueous

phase by an organic, tributyl phosphate phase. The kinetics of these extraction reactions were studied in the range of approximately 1 to 20 milliseconds phase contact time. These extraction reactions were complete in periods of from 3 to about 50 milliseconds, the latter being an extrapolated value. Photomicrographs of the dispersed organic droplets indicated diameters of 10 to 20 microns, corresponding to an area to volume ratio of about 6 x 10³ cm²/cm³. The apparatus consisted of stainless steel reservoirs which were connected to a tee-mixer. Fluid drive was by application of nitrogen pressure through a series of valves. The organic phase was separated from the aqueous phase by use of a porous Teflon and Armalon filter; analysis was by a chemical and a radiochemical method for the nitric acid and uranyl nitrate, respectively.

The experimental concentrations for the nitric acid 1.50 M nitric acid initially in the aqueous phase and, for each of these, 10%, 15%, and 20% by volume tributyl phosphate in the organic (kerosene diluent) phase. Equilibrium studies of the nitric acid-tributyl phosphate system yielded an equilibrium constant equal to 0.164 which is in agreement with previous values (6, 28).

The rate of extraction of nitric acid showed a temperature dependence for the 1.00 M nitric acid-10% tributyl phosphate extraction reaction. From the Arrhenius equation, the energy of activation was calculated to be 8900 cal./mole.

From the experimental data, the nitric acid extraction by tributyl phosphate at 25°C, was represented by the re-

lation:
$$(C_{eq}-C)_{org} = (C_{eq})_{org} e^{-\left[0.0015 \text{ e}^{4.26 \text{ (HNO}_3)}_{aq}\right].t}$$

where:

 $(C_{eq}-C)_{org}$ = difference between the nitric acid concentration in the organic phase at equilibrium and the nitric acid concentration in the organic phase at any phase contact time

(Ceq)org = nitric acid concentration in the organic phase at equilibrium

(HNO₃)_{aq} = initial nitric acid concentration of the aqueous t = contact time of the phases in milliseconds prior to separation

The extraction rate is markedly influenced by the aqueous salting strength, i.e., the nitrate ion concentration, so that the rate changes as the nitric acid concentration in the aqueous phase is varied. No dependence of the rate on the tributyl phosphate concentration was observed.

The experimental concentrations for the uranyl nitrate extraction by tributyl phosphate were 0.0243 M, 0.0508 M, and 0.0960 M uranyl nitrate initially in the 0.10 M nitric acid aqueous phase and for each of these, 10%, 15%, and 20% tributyl phosphate in the organic (kerosene diluent) phase. Equilibrium studies of the uranyl nitrate-tributyl phosphate combination yielded an equilibrium constant of 19; this value is in the range of other reported values of 7.7 (47) and 11 to 16 (48).

Rate studies of the uranyl nitrate-tributyl phosphate system resulted in the following rate expression:

$$(C_{eq}-C)_{org} = (C_{eq})_{org} e^{-\left[0.231 (NO_3^-)_{aq}\right] \cdot t}$$

where:

(Ceq-C)_{org} = difference between the uranyl nitrate concentration in the organic phase at equilibrium and the uranyl nitrate concentration in the organic phase at any phase contact time

= uranyl nitrate concentration in the organic phase at equilibrium

= initial nitrate ion concentration in the aqueous phase

= contact time of the phases in milliseconds prior to separation

The rate constant of the uranyl nitrate-tributyl phosphate extraction reaction is thus directly proportional to the nitrate ion concentration of the aqueous phase. As in the case of nitric acid extraction, no dependence of the rate on the tributyl phosphate concentration was observed.

Since only the middle portion of each reaction was studied, detailed mechanisms have not been proposed. Microfilm \$2.00; Xerox \$5.40. 108 pages.

ECONOMICS

ECONOMICS, GENERAL

STUDIES IN FUNCTIONAL INCOME DISTRIBUTION

(L. C. Card No. Mic 58-7492)

Rasool M. H. Hashimi, Ph.D. The University of Wisconsin, 1958

Supervisor: Professor Martin Bronfenbrenner

The two parts of this investigation are concerned with the functional income distribution in the United States over the period 1929-1955. The main source of data is the United States Department of Commerce, National Income, (1954 edition).

Part I: Is the labor share rising, falling or constant? The answer depends largely on what we mean by both labor and total income. Specifically: What is done with the income of proprietors of unincorporated enterprises? With transfer payments? With undistributed corporate profits? With tax receipts?

The allocation of proprietors' income to either factor tends to over-estimate that factor share. We follow the technique of Professor Budd (taking the annual average full-time employee compensation in each industry as a measure of proprietor labor income). The division of proprietors' revenue tends to be close to 50% labor, 50% property over the period studied.

None of the present conventional aggregates is adequately and consistently allocable between labor and property. In all except gross national product, the labor share is over-estimated because of the inclusion of capital but not labor depreciation. Gross national product and net national product both include items unallocable to either labor or property, i.e., indirect taxes. Property income from government interest is excluded from gross national product, net national product, and national revenue, as is labor income from transfer payments. Personal and disposable income underestimate property income by excluding corporate taxes and retained earnings. A system of accounts and aggregates that is meaningful for functional income distribution is developed. Two series of "allocable national income," gross and net, are designed so as to avoid all these deficiencies. Gross allocable income is derived from gross national product by adding transfer payments and subtracting indirect taxes. Net allocable income is gross allocable income net of both capital and labor depreciation (defined as food consumption).

The long-run tendency of the labor shares in these allocable aggregates is stable. The short-run tendency of the labor share in all measures is to move in a direction opposite to the business cycle.

Two other variants of allocable income are computed: private allocable and corporate allocable income. The conventional national and personal incomes are also broken down into property and labor shares. The secular trend of the labor share in personal income is the only one which is rising steadily; all others are stable or falling. The

rise in the labor share of personal revenue probably reflects the increased importance of corporate taxes and retained earnings more than any feature of the income distribution process.

A different classification is adopted in Part II of this study, which deals with the redistributive effects of inflation. Corporate profits and proprietors' income are considered as the "active components" (residuals) in gross allocable income in one concept. Wages and salaries (renegotiable in the short run) are added to the "active components" in a second concept. The active components in net allocable income are derived by deducting inventory valuation adjustment and labor depreciation from the previous two concepts.

The statistical evidence shows that the change in the price level, but not the price level itself, has a significant positive relationship to the active share in both gross and net allocable income. The simple, multiple and partial correlations with the absolute price level are significantly lower than those with price change.

Our conclusion thus confirms the hypothesis that the redistributional effect of inflation is in favor of business and labor, and at the expense of other property. This is true when inflation is defined in terms of rapid price increase rather than in terms of high price level.

Microfilm \$2.00; Xerox \$6.80. 142 pages.

ECONOMIC FACTORS AFFECTING CATTLE PRICES AT APPALACHIAN AUCTIONS

(L. C. Card No. Mic 58-7559)

Jack Dempsey Johnson, Ph.D. Iowa State College, 1958

Supervisor: Geoffrey Shepherd

The analysis was performed in four successive and closely related stages: single variable regression equations were used to investigate the linear relationship between grade and price; multiple linear regression equations were fitted with grade, carcass weight, dressing percentage, liveweight and time (visit number) as independent variables; the relationships between residuals from the multiple regression phase and selected other variables were examined; and finally, regular analysis of variance techniques were used to investigate grade-price relationships without imposing linear restrictions.

The multiple regression model was considerably more effective than the single variable model in accounting for the variation in observed prices. Ninety of the multiple regression equations had R²'s exceeding .50 as compared to only 23 for the single variable model. These results indicate that other variables in addition to grade also were important in the process of determining cattle prices.

Residual variances generally were largest for veals

and smallest for cows and tended to be slightly smaller at the large markets than at the small markets. Variances tended to be larger for equations describing farmer purchases than for other types of buyers.

Significant differences were found between buyers, markets and market classes, suggesting that the level and variability of prices for a given class of animals were affected by the market at which they were sold and the complex of buyers. These significant differences suggest an element of market imperfection.

The analysis of the residuals revealed very few significant departures from a linear relationship for grade over and above that previously removed. The pattern of residuals for weight classification groups indicated a difference in buyers' weight preferences for the different market classes at the various markets.

A general appraisal of certain marketing practices or operating procedures common to auctions in the Appalachian area suggests that pen-lot sales of graded animals closely sorted by weight and condition and the maintenance of a regular sales order in which all animals of a given class or type with the same general characteristics are sold in successive order tend to contribute to pricing accuracy and marketing efficiency. Both practices tend to reduce the buyers' uncertainty especially with regard to quality and also act to minimize the variation in prices for reasonably homogeneous animals in that buyers are able to make animal-to-animal comparisons in a more continuous manner.

Selling animals on the basis of "on arrival" weight instead of weight at time of sale and the practice of non-firm or "free wheeling" opening bids coupled with "by bidding" on the part of consignors and the auction management acts to increase buyer uncertainty and would tend to reduce pricing accuracy.

Microfilm \$3.40; Xerox \$11.60. 262 pages.

PRODUCTION IN THE SOUTH AND
IN THE HIWASSEE REGION

(L. C. Card No. Mic 58-7592)

Ignatz James Pikl, Jr., Ph.D. Vanderbilt University, 1958

Supervisor: Professor William H. Nicholls

Growth second only to that of the chemicals industry in recent years has vaulted the domestic pulp and paper industry into prominence among the nation's leading manufacturing industries. Much of this growth has taken place in the South, which now accounts for about three-fifths of the country's output of pulpwood. And, because 85 percent of the pulpwood used in the South is pine, the Southern pine pulpwood industry--with which this study is concerned-has become increasingly important to the South and to the nation.

Many pulpwood industry problems are touched upon in this study, but the principal hypothesis which is tested is that which states that the industry's growth--apparently no longer threatened by stumpage shortages--instead may be limited by rural population migration toward industrial centers within the South and toward places outside the South.

Chapter II provides necessary background information on the technology, growth and structure of the Southern pulp and paper industry. Chapter III furnishes a description of the pulpwood industry and, together with Chapter IV, sets forth in detail the conditions which led to sudden, severe declines in mill inventories of pulpwood in 1955, and which brought forth the migration hypothesis. During 1950-1954, growth of the pulp and paper industry was made possible by expanding pulpwood markets and during this period, the price of pulpwood remained constant. By 1954, expansion of market areas was nearly complete, and oligopsonistic interdependence increased. With an unprecedented rise in the demand for wood, caused by growth of existing mills and by sudden entry of six newcomers to the industry, the inventory problem arose. The one-price system and price leadership under which pulpwood is sold, together with the increase in interdependence, caused mills to engage in indirect and non-price competition for wood, each seeking individually to manipulate supply without rising the price. Cost conditions force long-run expansion of the pulpwood industry through increases in the number of production units, rather than through increases in individual unit size. Mill tactics failed to draw a sufficient number of new entrepreneurs into the market, and relative shortages of wood resulted. Once prices were raised, inventories again returned to "safe" levels.

Chapters V-IX are concerned with pulpwood supply problems in a 147-county area (the Hiwassee Region) from which one mill obtains the bulk of its wood. Chapter V provides a description of the study area, its population and industrial structure. Chapter VI sets forth the conditions affecting the demand for, and supply of, pulpwood in the Region, and Chapters VII and VIII present a detailed statistical analysis of the structure and operations of a sample of 240 pulpwood production units. Because of the intermittent nature of the work and consequent low returns which accrue to both labor and entrepreneurship--which are examined and compared to returns in agriculture and industry--the conclusion is reached that the pulpwood industry can expect to draw workers from agriculture and to lose workers to industry. The critical problem, however, is that of the supply of entrepreneurial talent, which is explained in detail. Finally, in Chapter IX, the relationships between population size and movements, on the one hand, and pulpwood output and changes in output, on the other hand, are examined by use of multiple correlation analysis. Population movements and industrialization appear to have had no appreciable effect upon pulpwood labor supply because: (1) most of the wood is produced by members of a rapidly expanding rural non-farm population, and little is produced by the shrinking farm population; and (2) areas in which farmer contributions to supply have been relatively large are those from which farm population migration has been light, and farm population losses have been concentrated in areas where farmers contribute little to supply. In short, the population-industrialization hypothesis appears to be invalid, at least insofar as the Region is concerned.

Microfilm \$6.45; Xerox \$22.20. 505 pages.

THE ECONOMICS OF COMMERCIAL FISHING WITH SPECIAL APPLICATION TO NORTH CAROLINA

(L. C. Card No. Mic 58-5977)

George Milton Woodward, Ph.D. The University of North Carolina, 1958

Supervisor: Clarence Edward Philbrook

This study has two major purposes. The first is the exposition of the economics of commercial fishing by means of the appropriate application of macro- and micro-economic theory, and the second is the use of the theoretical construct in the determination of the advantages and disadvantages in the production of fishery products which obtain in North Carolina.

The study of the micro-economics of the commercial fisheries reveals that the fishing trades are subject to all the economic hazards of other highly competitive extractive industries such as agriculture, plus some that are unique. The demand for fishery products in general is such that there is a tendency for demand to be inelastic as prices fall and elastic as prices rise from usual levels. The theory of production and supply integrates conventional economic principles with ecology. This combination of methods of analysis indicates the uncertainty of stable equilibria and results in the practical conclusion that the restrictions imposed on fishing in the interests of conservation, at best, often do not achieve the objectives sought; and, at worst, seriously lessen the economic efficiency of production methods. The determination and analysis of the macroeconomic data for the fisheries of the United States indicate that economic forces have operated in the period of the last twenty-five years to allocate resources to the industry in almost exactly the way that would be expected from economic theory.

The fisheries of North Carolina are relatively small compared with those of the entire United States and in only three counties of the State do they account for a significant part of total economic activity. Because of the decline in the production of food finfish and oysters, the rate of growth of the fisheries of North Carolina over the past twenty-five years has been slower than that of the economy of the State as a whole and of the fisheries of both the entire United States and the remainder of the South Atlantic region.

The production of food finfish decreased because of lessened abundance of some of the species and the reduction in economic incentive due to relatively small price increases. Non-food finfish production increased slightly as the combined effect of biologic abundance and the changing conditions in world food markets, particularly those for fats and oils.

The rebuilding of oyster production is of especial importance to the fisheries of North Carolina. The dark color and excessive loss of fluids characteristic of southern oysters are market handicaps, but technical research under way may overcome these problems. The most serious deterrent to the expansion of oyster production is public policy which discourages private oyster cultivation.

The shrimp fishery of North Carolina has reached a plateau of production after a period of spectacular growth. Hydrographic conditions and nearness to Eastern markets result in cost advantages which are approximately offset by the low market prices for the small shrimp produced.

Additional manufacturing of fishery products does not offer any significant possibilities in North Carolina. There is little or no production of the species of food finfishes which could be processed profitably in competition with New England and foreign countries. Technical problems and the irregularity and inadequacy of supplies of raw materials would have to be overcome for the development of oyster processing. Shrimp freezing will increase but only slowly because of the high prices that the product commands on the fresh market. The packing of crab meat is retarded by inferior natural productivity compared with Chesapeake Bay and the opportunity costs of shrimp fishing during the summer season.

Microfilm \$3.60; Xerox \$12.20. 280 pages.

FERTILIZER DEMAND FUNCTIONS OF UNITED STATES FARMERS

(L. C. Card No. Mic 58-7571)

Hsiang Hsing Yeh, Ph.D. Iowa State College, 1958

Supervisor: Earl O. Heady

This study deals with the demand for a particular resource, fertilizer, by farmers. It is part of a larger study dealing with the demand for resources and the supply of products by farmers. It is an aggregative study, based on time series data, indicating the variables related to fertilizer use in the United States as a whole and for ten agricultural regions.

The main objectives of this study are to predict the demand functions for commercial fertilizer and total plant nutrients for the United States as a whole and for each of the ten agricultural regions; and to test empirically the demand elasticity for fertilizer and elasticities of fertilizer with respect to crop prices, farm incomes, and total acreage of cropland over time.

Data for the fertilizer demand functions are obtained from Agricultural Statistics and other U. S. D. A. bulletins for the calendar years 1910 through 1956.

The main algebraic form of equation used in this study was a Cobb-Douglas type. The first differences in logarithmic form, a linear and a modified quadratic form with a squared variable of time, used as alternative equations.

Evidence of the nature of the dynamic theory of resource demand exists in the time series data. After excluding the innovation period (1850-1909) and the period (1944-50), the results from the normal period, shifting demand with shifting supply, are quite consistent with the nature of fertilizer demand by farmers.

The Cobb-Douglas equation can be considered as the demand function for fertilizer in the United States. It particularly fits in the period 1910-56 (omitting 1944-50). With the criterion that we desire the smallest standard error of the estimate, the first differences in logarithmic form is probably sufficient to be considered as the demand equation for region 1. With the higher adjusted coefficients of determination, the linear equation could be considered as the demand function for regions 3, 5, and 6 and the modified quadratic equation for region 7. The remaining regions 2, 4, 8, 9, and 10 were best fitted with the Cobb-Douglas equation.

The two-equation demand and supply model in the overidentified case was designed to measure these relationships for nitrogen in the period 1926-56 and was estimated by the maximum likelihood method in the reduced form. In general, the results were consistent with logic and provided some auxiliary information about the productive capacity of nitrogen and production costs of fertilizer.

Besides, the expectation model proposed by Nerlove which also was employed as a final check on methodology. The empirical results appear that the assumption that farmers closely identified expected prices with the last year's price and quantity is quite reasonable.

In addition, the estimated quantity of fertilizer demanded for 1957, 1958, and 1965 was derived by applying the Cobb-Douglas equation and the first difference equation. It seems likely that the upward trend of fertilizer use in the United States will continue over the next ten years.

In summary, it appears possible to derive estimates of resource demand responses from both single and simultaneous equations that are not inconsistent with economic theory and statistical logic. It seems likely that further work should be done utilizing these techniques to analyze other agricultural resources.

Microfilm \$2.00; Xerox \$6.00. 123 pages.

ECONOMICS, COMMERCE - BUSINESS

MARKETING STRATEGIES IN THE FIBERGLASS PANEL INDUSTRY

(L. C. Card No. Mic 59-206)

William Fain Egloff, Ph.D. Northwestern University, 1958

A new industry started in 1947 with two firms going into the production and marketing of fiberglass panels. Since then, the industry has grown to fifty-seven firms, doing nearly twenty million dollars of business. This study examined the first nine years of this growth for the purpose of analyzing the marketing policies and strategies in this rapidly developing industry. The objective was to discover whether firms adopted similar or different strategies in marketing the new product, and to examine the hypothesis that strategies varied according to the size of the firm.

Sources of Data and Methodology

Since the industry was so new that there was no general source of information, the task of gathering data was accomplished by personal interviews with policy-making executives of twenty-three manufacturers, selling ninetyfive per cent of the output of the industry. Since certain questions involved reference to sales and accounting records, a statistical data questionnaire was left with each of the respondents to be returned by mail.

Next, the various policies and strategies of these manufacturers were compared to isolate patterns of conduct in this new industry. Finally, a hypothesis relating the size of individual firms and these patterns of conduct was con-

structed and verified.

Summary

Two characteristics of the panel industry determined the strategies of its manufacturers: (1) the panel was a standardized product and could not be effectively differentiated; and, (2) manufacturing processes gave rise to different cost functions depending on the amount of capital invested. Thus, large firms with heavier capital investment and resulting lower production costs derived the major portion of their business from large-order fabricators and other industrial users and from the government. The large firms also had longer channels of distribution, more promotion, and a more flexible pricing policy than their smaller competitors.

The smaller manufacturer typically used a type of manufacturing process which required a smaller capital investment but resulted in a higher priced product. The small firms could not afford long channels of distribution, but had to go directly to the buyer. This cost position also forced the smaller firm to "ride" on the larger firms' advertising, to incur higher ratios of selling expense to sales, and to restrict their ability to compete for large volume business on a price basis.

Salient characteristics of the industry were ease of entry and rapid turnover of constituent firms. These factors tended to demoralize the industry's pricing structure, lower the quality of its product, and create a fluid pattern of promotional programs - all of which complicated the prosecution of this study.

It was an industry of small firms, which had, quite interestingly, not attracted much attention from the nation's industrial "giants." Becuase of the newness of the industry and lack of interest displayed by older, larger firms, management personnel was limited in numbers and in experience. With young, unaffiliated, expanding firms, the industry was under financial stress. In general, the larger firms made more effective use of their capital as evidenced by higher stock-turn rates, return of invested capital, and so forth.

Suppliers, who by comparison with any of the panel manufacturers were very large, had reportedly fostered high entry into the industry through liberal credit policies. In spite of this evidence of interest, the suppliers had left technological and market development largely to the small panel manufacturer.

As firms matured and grew in size, marketing policies were found to shift according to fairly well defined patterns - particularly in the selection of channels of distribution Microfilm \$6.20; Xerox \$21.40. 485 pages. and pricing.

THE FACTORS AND PROCESS OF INDUSTRIAL SITE SELECTION

(L. C. Card No. Mic 59-631)

George Michael McManmon, D.S.S. Syracuse University, 1958

This study begins with the presentation of theories and empirical studies of location put forth by Von Thunen, Weber, Predohl, Englander, Weigman, Palander, Losch, E. M. Hoover, Isard, Greenhut, Sombart, Ross, Hall, Mc-Laughlin and Robock, Neuhoff, and various bureaus of business research. Although these earlier presentations offer

much of value on the question of business location, still there has been lacking heretofore a thorough non-leading investigation of what businessmen themselves consider when planning a new site. Such an investigation with its results and conclusions has been carried out in this work.

Secondly, there is outlined a new description of business based on the more traditional framework, yet capable of embracing the ideas gained from businesses which answered the non-directive letter sent to them. The description thus devised is composed of seventeen functions, all of which operate within ten containing factors.

The primary conclusions reached are these:

1. Business administration may be visualized as a dekahedron, its sides being the containing forces geography, people, transporation, utilities, plant site, community services, living conditions, community attitudes, government, and economics; working within are the seventeen functions: production marketing, procurement, selling, preparation, publicity, transportation, storing, inspection, research, use of funds, risk taking, records, accounting, statistics, financial relationships, and human relationships.

2. The process of industrial site selection has been developed so that, with few modifications, it can fit into the

general description of business administration.

3. The description of the functions and processes
(a) makes it possible to incorporate any business problem,
(b) provide a groundwork for further research, and (c) lays
a foundation on which may be built many successful mergings of business and communities. These three ends offer
avenues by which knowledge of business in general and
industrial site selection in particular can be increased.

4. The problem of industrial location is shown to be merely a special problem of business administration. This point is strongly illustrated by the replies of the 178 firms contributing their own ideas on this subject; all the replies

fall under one of the ten containing forces.

5. The possibility is clearly revealed that in the near future the needs and wants of firms wishing to select a site may be matched with the available resources of many communities. The matching could easily be done by electronic equipment already in use and could suggest more communities to businesses and more businesses to communities than the methods now employed.

Microfilm \$4.50; Xerox \$15.00. 350 pages.

AN ECONOMIC STUDY OF THE MILITARY AIRFRAME INDUSTRY

(L. C. Card No. Mic 58-7256)

Miguel Ángel Reguero, Ph.D. New York University, 1958

Adviser: Professor A. Anton Friedrich

During the past eighteen years Air Power has achieved a tremendous importance in the defense and in the lives of the people of the United States; and since 1945 it is no longer air power as such, but Atomic Air Power. The growing importance of this Power led to the creation on September 18, 1947 of the United States Air Force as an autonomous partner of the National Military Establishment. And not only is the Air Force no longer an auxiliary arm

of the Army, subserviently used to support land action, but since the invasion of South Korea budgetary allotments to the Air Force have begun to exceed those to the Army or to the Navy. For example, estimated expenditures during the fiscal year 1958 are as follows: Air Force, \$17.5 billion; Navy, \$10.3 billion; Army, \$9.1 billion. Of these amounts, \$6.7 billion is for aircraft, \$2.0 billion is for guided missiles, and \$1.0 billion is for ships.

The importance of the United States airframe industry, on which Air Power depends, has grown vis-a-vis that of the Air Force; and in the event of another war, a major part of the huge war production load would fall on this multibillion dollar industry. Notwithstanding this vital importance, comparatively few studies are available to the general public on this industry. Most of the published material has been in magazine articles, dealing briefly with some particular aspects of the industry. Due to security regulations and the competitive nature of the industry, more ambitious studies have not been published. The studies available have been prepared for the use of the Military Services when the Services have been interested in some specific problem.

The author has, consequently, undertaken this study not only with the object of presenting an overall economic view of the military airframe industry and acquainting the burdened taxpayers of this country with the importance, some of the problems, and complexity of an industry into which annually go many billions of their dollars, but also to arouse them to the urgent importance of good and effective planning for national defense. Effective planning is a must if we are to preserve for posterity the democratic traditions which are our heritage.

This study is chiefly concerned with the military airframe industry, to the exclusion of the military aircraft engine, electronic, propeller, etc., industries, due to the need of narrowing the field of investigation and, above all, becuase the airframe segment of the aircraft industry is the most important part. It gives rise to more employment, floor area, and dollars and pounds of output than does the rest of the aeronautical industries combined. Moreover, the real problem to the Air Force is primarily: How many airframes can we produce under mobilization? -- not how many engines or other end items. This study deals with the military airframe industry, rather than just the airframe industry, since it constitutes the bulk of the airframe industry -- as shown in Chapters I, IV and V -- and is the one that will bear the brunt of the call for aircraft in case of war.

This study consists of three parts. The first three chapters deal with the quantitative and qualitative development of the airframe industry and of the product it manufacturers. Chapters four through six are devoted to the more pronounced characteristics of this industry. The author hopes these two parts will provide sufficient background for a better appreciation of the economic aspects pertaining to this industry, which is the concern of part three: wages, fringe benefits, capital, sales, profits, pricing, renegotiation, Learning Curve, etc.

Microfilm \$5.50; Xerox \$19.40. 430 pages.

CORPORATE PENSION FUNDS AND THEIR EFFECTS ON OTHER SAVINGS INSTITUTIONS

(L. C. Card No. Mic 59-638)

Edmund Humphry Woolrych, Ph.D. Syracuse University, 1958

There is no clear evidence that the growth of pension funds has affected the growth of other savings institutions. However, there are corroborative indications that pension growth may have dampened the growth of life insurance company assets. Such are the conclusions of the present dissertation.

The importance of this study stems from the hypothesis that savings institutions invest in a characteristically and substantially different manner. A review of the portfolio purchases of the major classes of savings institutions during the past seven years demonstrates sufficiently the truth of this hypothesis. Thus, a shift among savings institutions in their growth rates would result in a change in the type of investment media being sought in the capital markets. Since the class of instrument has typically been related to some section of the economy, e.g., mortgages to home building, such a shift in asset growth rates carries with it profound relevance to broad sectors of the economy.

Industrial retirement plans continue to adopt provisions which provide greater benefits to the employee. Larger amounts of funds are being required each year for the funding of these benefits. A review of the specific features of a large number of industrial retirement plans supports the above conclusions.

The assets of corporate (trusteed) pension funds have grown very rapidly in relation to classes of individual savings, and can be expected to grow more rapidly during the next five to ten years than the assets of other classes of savings institutions. The results of some ten-year projections of assets of savings institutions were reviewed in support of these findings.

Contractual type and residual type savings institutions were defined in relation to the contracts or general behavior patterns surrounding the individual's savings contributions. The effects of pension fund growth should be sought, it was concluded, where the similarity of contractual arrangement between saver and institution suggests a similarity of savings motivations. In this way the life insurance industry was selected as the area in which the effects of substitution might appear.

The non-savings component of life insurance company assets have been growing most rapidly during the period of pension fund asset growth. Other corroborative inferences are possible. However, the data have not been gathered which would convincingly show any causal relationship. Some projects directed toward the methods of obtaining such data are described in the final chapter.

Microfilm \$3.05; Xerox \$10.40. 234 pages.

ECONOMICS, FINANCE

RECENT ARCHAEOLOGICAL DEVELOPMENTS INVOLVING PRE-CERAMIC CULTURES IN THE MIDDLE RIO GRANDE

(L. C. Card No. Mic 58-7205)

George Allen Agogino, D.S.S. Syracuse University, 1958

Supervisor: D. G. Haring

Purpose: Presentation of recent discoveries of preceramic sites and cultural horizons in the Middle Rio Grande region of New Mexico. These discoveries have enlarged our knowledge of "classic hunting" cultures and verified earlier clues of a widespread cultural horizon apparently based upon a gathering economy.

The discoveries cited were in large part achieved by personnel now or formerly connected with the Anthropology Department of the University of New Mexico, including the writer. Data for this dissertation is derived from my own field research together with library sources and personal contacts with other archaeologists.

The first four chapters trace the historical development of our knowledge of the Paleo-Indian in the West and Southwest with particular emphasis upon sites that have produced cultural material that is apparently represented in Central New Mexico. The next four chapters deal directly with recent pre-ceramic discoveries in the Middle Rio Grande.

Paleo-Indian sites are extremely scarce and satisfactory chronological and typological systems are still being developed. Widespread acceptance of the Paleo-Indian is only thirty-one years old. The problem is clear, the situation difficult. Our hope lies in extracting the maximum information from the limited sites available.

Microfilm \$2.45; Xerox \$8.60. 188 pages.

SOME PROBLEMS OF FISCAL POLICY IN UNDERDEVELOPED COUNTRIES WITH SPECIAL REFERENCE TO INDIA

(L. C. Card No. Mic 59-24)

Raja J. Chelliah, Ph.D. University of Pittsburgh, 1958

The aim of this study is to delineate the role of fiscal policy in underdeveloped countries and to outline a fiscal policy, especially a structure of taxation, that is appropriate for a country like India.

Since the low rate of investment is the most important factor responsible for the low rate of growth of income in underdeveloped countries, raising the ratio of saving to national income should be the most important goal of fiscal policy. An almost equally important goal is the equitable distribution of national income. If fiscal means are to be used to achieve these objectives, public finances must be conducted on a functional basis. The functional finance approach appropriate for an underdeveloped economy, however, differs from that appropriate for a developed economy. In the latter, emphasis is placed on stability; in the

former, emphasis has to be placed on raising the rate of saving in the economy.

If fiscal policy is to fulfill the objectives that we have postulated, the structure of taxation must be based on principles that are conducive to the attainment of these objectives. It is shown that the tax system should be so designed as (a) to mobilize a great part of the potentially investible surplus in the economy; (b) to enlarge the surplus and gather for the state a part of the increments in the surplus; and (c) to reduce extreme economic inequalities and prevent the accumulation of individual wealth beyond a certain level. Two additional rules suggested are that the burdens involved in economic development should be distributed equitably among all classes of the population and that each person should pay in taxation in accordance with his unused capacity to contribute to economic development. Thus the presumption is in favor of a tax system that penalizes excess consumption and treats leniently income that is saved.

The system of direct taxation recommended consists of (a) an income tax which covers realized capital gains, and at the same time contains a scheme of partial exemption of income invested in acceptable ways; and (b) an annual tax on wealth with a high exemption level; and (c) an inheritance tax supplemented by a gift tax.

The various effects of indirect taxes are analyzed in detail in the setting of an underdeveloped economy. In the light of this analysis and the postulated goal of raising the incremental saving ratio, it is suggested that the best system of indirect taxation would be a combination of a general sales tax and a few selective excises. Necessaries should be exempted from taxation and luxuries should be taxed at high rates.

In the light of these principles, it is found that the present Indian tax system needs some modifications. The important modifications suggested are:

- (1) Companies should be asked to pay only the corporation tax.
- (2) Special provisions should be made for bringing under charge the incomes of moneylenders and small traders, large parts of which now escape taxation.
- (3) Instead of the present separate expenditure tax, it would be better to build into the income tax a scheme for partial exemption of income acceptably invested.
- (4) The development rebate should be confined to industries of national importance and tax holidays should be terminated.
- (5) Excise taxes should be converted to an <u>ad valorem</u> basis, to make their yield responsive to change of prices.
 - (6) Necessaries should be exempt from taxation.
- (7) The principle of taxing industries on the sole ground of their benefiting from protection should be abandoned.

Microfilm \$3.60; Xerox \$12.20. 278 pages.

ECONOMICS, THEORY

THE DELIBERATE DEVELOPMENT OF ENTREPRENEURS IN UNDERDEVELOPED AREAS

(Publication No. 24,131)

Rafael de Jesús-Toro, Ph.D. Syracuse University, 1957

The existing disparity of material welfare between the industrially-advanced countries and the so-called underdeveloped regions is one of the greatest problems facing the world community. This situation poses a basic moral challenge to the Christian values of Western civilization. Increased nationalism, desire for greater political and economic independence, and requirements of a rapidly increasing population provide more practical motivations for deliberate development efforts in the underdeveloped areas while the exigencies of the "Cold War" are forcing the bigger Powers to undertake special programs of assistance.

Available statistics for the last thirty years show significant differences in the level of per capita income in various areas of the world. Such differences do not seem to have decreased during the period 1925-1948. Intercountry per capita income comparisons, however, pose very serious conceptual and practical problems. An examination of nutritional conditions in various countries indicates the widespread inequalities in material well-being that prevail.

The only practical way available to increase precariously-low levels of living in underdeveloped regions is rapid economic development. This process is very complex. However, the functions of entrepreneurship are so essential to it that it may be said that these constitute the crucial elements of development. Consequently, the critical problem in any development program in underdeveloped areas is the deliberate inducement of entrepreneurs since the lack of these is their most important "poverty." This is not a new discovery for economists since the Physiocrats have been emphasizing the importance of the entrepreneur or the capitalist-owner to economic activity. The import of the entrepreneur to economic expansion in underdeveloped countries acquires new significance because these societies have produced relatively weak business enterprising groups.

The development of a strong business class oriented toward the accumulation of wealth was a long process in Western countries which took centuries in unfolding. The more recent experiences of Japan and Soviet Russia indicate that such groups may be brought into being in relatively short periods of time. The desire for and the need of rapid economic progress in underdeveloped areas make it necessary that special measures be taken to induce the formation of entrepreneurs, regardless of whether these act as private profit seekers or as government bureaucrats.

There are some types of measures that must be taken in some countries which might be termed removal of obstacles to the emergence of entrepreneurs. Large-scale land reform schemes are needed in some cases so that potential entrepreneurial talent and financial resources will be diverted from traditional forms of agriculture into more "productive" forms of economic activity. The provision of overhead capital - especially transportation facilities - have a crucial role to play in creating more

attractive conditions in which entrepreneurs can operate more profitably. The creation of new financial institutions provides means by which innovating entrepreneurs are brought into contact with people who are willing to hold financial instruments as part of the reward for the productive services they render.

Direct foreign investment stimulates local entrepreneurship by serving as practical training "schools" for

indigenous personnel.

Government assistance in the promotion of entrepreneurship falls into two broad categories: financial and technical. The former may take the form of attractive loans, governmental equity participation under various arrangements, and favorable tax and tariff policies. The latter includes management training, the conduct of market surveys, and organizational and technical studies. Where inducements to private groups fail, the government itself may assume the role of the entrepreneur.

International and bilateral programs of assistance should place greater emphasis for providing means of training suitable managerial candidates from underdevel-

oped areas.

Microfilm \$4.40; Xerox \$14.80. 344 pages. Mic 59-929

THE COMMUNITY INCOME MULTIPLIER: AN EMPIRICAL STUDY

(L. C. Card No. Mic 58-1471)

Charles Mills Tiebout, Ph.D. University of Michigan, 1957

The research involved in this paper considers the problems posed by the following two questions: (1) Can a theoretical economic model be constructed which explains the level of short-run community income? (2) Given the community income model, can rough estimates be made of the dollar magnitudes of the major variables involved? Since this is the first time a model of this type has been constructed with an attempt at empirical approximations in mind, a community with a simple economic structure is investigated--Winnetka. Illinois.

In constructing a short-run community income model the economic activities of a community are divided into

two types: (1) those whose level is set by forces outside the community's economic system, exogenous activities; and (2) endogenous activities, those whose level is determined by the exogenous sector. For a small community the major exogenous activities are assumed to be the export sector while the retail and service sector makes up the major endogenous activities.

For Winnetka an input-output model reduces to a system of Keynesian-type of equations:

- (1) Incomewinnetka = Incomeendogenous + Incomeexogenous
- (2) Income_{endogenous} = b Income_{winnetka}
- (3) Income exogenous = set exogenously

Equation (2) is assumed to be proportional to income. Since the data with which this study deals give the structure of the community for only one point in time, the assumption of a proportional relation is dictated by necessity. However, if the cause of increased community income is increased population, the use of the average propensity to consume in estimating income changes has some justification.

The empirical adaption of the model is carried out by collecting data via personal interviews with 139 spending units in Winnetka. The data from these interviews give a total income for the community of 65 million dollars of which 60.5 is earned outside of Winnetka in exogenous activities. By surveying the business and government sectors another 2 million dollars is estimated as exogenous income. This information together with the model presented above yields an income multiplier of 1.04. This small value is not surprising in view of the large leakages to Chicago and the small size of the retail sector.

This value for Winnetka is compared with similar estimates made for Ann Arbor, Michigan and Evanston, Illinois. In these communities the estimate of the income multiplier is around 1.07. These higher values are consistent with larger community size and, therefore, smaller leakages from the community income stream.

Evidence from the Ann Arbor and Evanston studies enable us to say something about the determinants of the average propensity to consume local goods. The proportion the community residents tend to spend outside the local area depends on the level of income, the number of years in residence in the community, and attitudes towards shopping.

Microfilm \$2.00; Xerox \$6.00. 123 pages.

EDUCATION

EDUCATION, GENERAL

TEACHING PHYSICS ON CLOSED CIRCUIT TELEVISION

(L. C. Card No. Mic 59-624)

Herbert Sternbergh Bailey, Ph.D. Syracuse University, 1958

The first semester of general physics was taught on closed circuit television to develop teaching techniques for the lecture-demonstration presentation of the subject by this medium, and to compare the effectiveness of instruction by closed circuit television with regular classroom instruction.

Matched pairs were determined based on grade-point index and sex. There were twenty-one pairs, twelve of them women and nine men. One member of each pair received two lectures a week by closed circuit television. The other member was instructed in a regular science classroom. Individuals were randomly selected for closed circuit television or regular classroom instruction; personal preference was not considered.

A pretest consisting of seventy-eight multiple choice items was administered at the start of the course. The two groups had means of 11.0 and 9.4 on this test. These were not significantly different as determined by the t-test for the difference between means.

This same test was given as part of the final examination in the course. The means for the two groups were 29.5 and 29.0.

Achievement for individuals was determined as the difference between the pretest score and posttest score. The t-test for the difference between achievement for matched pairs was used to test the hypothesis that there was no difference between the achievement for the two methods of presentation. The value of t was too small to be significant, and the hypothesis would not be rejected. There was no significant difference between the achievement of the two groups. Instruction by closed circuit television was just as effective as regular classroom face to face instruction as determined by this study.

Maximum use was made of available visual materials in teaching the course. Demonstration equipment was used in nearly every lecture, supplemented in some cases by film strips.

Laboratory periods were spent in performing exercises from prepared laboratory sheets.

According to an opinionnaire administered to the closed circuit people at the end of their period of instruction, student attitudes toward instruction by television were not favorable. A majority felt that achievement, retention of subject matter, and final marks in the subject would suffer because of television instruction. They disagreed that television offers fewer distractions and enables students to concentrate better. They were about equally divided on whether or not television allows students to view demonstrations much more closely. Thirteen out of twenty-one

said they disliked the course. Sixteen would prefer a conventional class, but twelve would prefer television to a large class of several sections.

Instruction by closed circuit television can be just as effective as regular classroom instruction. A number of sections can be taught at the same time with equal effectiveness. Much of the student disapproval could probably by changed by correction of technical difficulties. Comments on the opinionnaire showed that they were sensitive to poor sound and bad pictures.

Microfilm \$2.00; Xerox \$6.00. 123 pages.

THE STERN ACTIVITIES INDEX AS A MEANS OF PREDICTING SOCIAL ACCEPTABILITY AND IMPROVEMENT IN READING SKILLS

(L. C. Card No. Mic 58-7208)

Daniel A. Briggs, Ph.D. Syracuse University, 1958

Purpose

The purpose was to determine whether the Stern Activities Index (AI) could be used as a supplementary screening device to predict the social acceptability of individuals for a pre-defined group situation and to determine if the AI could also be used to predict improvement in reading skills after a given period of instruction.

Procedures Followed

The AI was administered to a pilot group, all the students in attendance at the Syracuse University Summer Reading Camp during the summer of 1956. On the basis of teacher ratings of the social acceptability of these students, groups of "highly acceptable" and "rejectable" students were formed. Statistical analysis indicated different AI need patterns for the two groups, and a multiple correlation coefficient based on the different needs was computed. The 1956 regression equation was used to predict social acceptability for the students at the 1957 camp. The AI predictions of social acceptability for the campers were compared with teacher ratings of the campers' social acceptability made at the close of the 1957 camp.

On the basis of teacher estimates of reading improvement for all students at the 1956 camp, groups of "high" and "low" improvers were formed. Statistical analysis indicated different AI need patterns for the two groups, and a multiple correlation coefficient based on the different need patterns was computed. The 1956 regression equation was used to predict reading improvement for all the campers in 1957. The AI predictions of reading improvement were compared with the teacher estimates of reading improvement made at the close of the 1957 camp.

All the staff at the 1957 camp took the AI. Each member's AI pattern was examined in relationship to the AI patterns of the campers he had rated in order to determine whether similarity of personality need patterns had affected his ratings of the campers' social acceptability which these raters had given to the campers.

Results

On the basis of the 1956 regression equation a distribution of predicted social acceptability scores was constructed for the 1956 campers. This distribution was examined and the relative positions of the "accepted" and the "rejected" students were noted. At the point in this distribution that gave the best percentage of accuracy of prediction a cutting point was established. This cutting point gave the AI 79 percent accuracy in locating the "rejected" and the "acceptable" students in the distribution. By using this cutting point for the 1957 campers it was shown that the AI and the staff were in agreement in 77 percent of the cases on the placement of the campers into the two categories.

With the regression equation from the 1956 camp a distribution of predicted reading improvement scores was constructed. At the point in this distribution that gave the best percentage of accuracy of prediction, a cutting point was established. This cutting point gave the AI 69 percent accuracy in locating the "high improvers" and the "low improvers" in this distribution. By using this cutting point, predictions of reading improvement were made for each of the students at the 1957 camp. An examination of the AI predictions and the teacher estimates of improvement showed percent agreement between the two.

The findings show that the camp staff were viewing camper social acceptability and camper reading improvement as nearly independently as possible. Very low correlations for both 1956 and 1957 were found to exist between staff rankings of acceptability and reading improvement for the same group of students.

Chi square tests indicated that the staff members who rated the campers on social acceptability were not significantly influenced in making their ratings by personality similarity as measured by summary vector differences on the AI.

Conclusions

This study indicates that the AI is a useful supplementary screening device to aid the selection committee of the camp in predicting the social acceptability of the prospective campers, and in predicting probable improvement in the camper's reading skill.

Microfilm \$2.05; Xerox \$7.20. 155 pages.

ROLE CONCEPTIONS AND INTERRELATIONSHIPS AMONG FACULTY MEMBERS OF SCHOOLS OF NURSING

(L. C. Card No. Mic 58-2956)

Esther de la Cruz, Ph.D. State University of Iowa, 1958

Chairman: Professor A. N. Hieronymus

This study dealt with attitudes of faculty members toward issues and practices involved in role conceptions and problems of interrelationships among faculty members of schools of nursing.

The data for this study were obtained by means of questionnaire called the 'Faculty Opinion Survey." Through interviews with directors of schools of nursing, information concerning practices and problems in the participating schools was obtained by the writer.

Forty-five faculty members from five selected schools of nursing in the state of Iowa made up the sample.

The attitude of faculty members toward certain issues and practices which involved role relations are summarized as follows:

- 1. Almost all of the faculty members would prefer to live in private residence facilities rather than in nurses' residences.
- 2. The majority agreed that the administrative staff and instructional staff should plan and conduct the orientation program and the in-service educational program jointly and cooperatively.
- 3. The majority believed that the assignment of responsibility of faculty members should be definite, realistic, and reasonable.
- 4. Almost all believed that general faculty meetings should be held frequently in which faculty members would be free to exchange ideas and express their opinions.
- 5. Almost all would prefer to work on group projects rather than on individual assignments.
- The majority felt that most of their colleagues were as interesting and well-adjusted as other members of professions of similar standing.
- 7. More than half of the faculty members felt that certain responsibilities such as clerical work, certain teaching assignments, making out students' rotations, recording of students' monthly experience, and some duties pertaining to administration and public relations should be assigned to someone with a different type of training.
- 8. Faculty members felt that certain responsibilities such as making out student hours, correcting test papers, committee meetings, and preparing course outlines, were too time-consuming.

Problems of interrelationships among faculty members were identified as follows:

- 1. Conditions given by faculty members which give rise to feelings of insecurity were lack of recognition, insecurity, poor administrative relations, and feelings of personal inadequacy.
- 2. The major problems that faculty members consider to be at the root of difficulties in personal relationships

with nursing service were conflict of aims of nursing education and nursing service, misunderstanding of responsibilities, problems of communication, lack of experience on the part of instructors, and need for more capable and efficient staff in nursing service.

3. The three factors which faculty members report most often as a source of difficulty in student-teacher relationships were recognizing individual differences in students and trying to adjust instruction accordingly, lack of responsibility on the part of students, and lack of maturity and readiness on the part of students.

If the trend in professionalization of nursing education is to continue, more highly trained professional staffs will have to be built and responsibilities will have to be more clearly defined. Most of the staff members participating in the study had little or no training beyond the bachelor's degree, were relatively inexperienced in nursing education, and do not expect to stay in the profession. A considerable amount of their time is occupied by tasks which are neither stimulating nor conducive to professional development. Problems of interpersonal relationships arise most often out of overlapping or conflicting responsibilities. Better understanding of the objectives of all phases of the training program and more adequate preparation on the part of the staff in human relations should go a long way toward alleviating these problems.

Microfilm \$2.00; Xerox \$6.20. 126 pages.

AN EXPERIMENT IN THE DEVELOPMENT AND USE OF EDUCATIONAL FIELD TRIPS

(L. C. Card No. Mic 58-7597)

Hawthorne C. Evans, Jr., Ed.D. The University of Tennessee, 1958

Major Professor: Galen N. Drewry

This study was concerned with development of aids for field trip planning and experimental study of the values of these aids in actual field trip experiences.

Two hypotheses were selected for testing. The first hypothesis was that it is possible to form instruments which would aid in the planning and carrying out of more effective educational field trips. The second hypothesis was that pre-planning and follow-up of the field trip using these instruments and other techniques would aid immediate learning and retention of the knowledge gained from the field trip.

Interviews and a review of literature relating to the educational field trip led to the formation of a list of items which when computed would seem to answer many of the questions necessary to insure the effectiveness of the field trip. Eighty-one potential field trip sources were contacted in Hamblen County, Tennessee, and sixty-five chose to complete field trip outlines. These outlines were included in a booklet, "Educational Field Trips," which was duplicated and distributed to the teachers of the Morristown, Tennessee, schools.

Eleven classes from the Morristown schools were then involved in field trips to test the value of the planned field trip as compared to the unplanned field trip. Planning procedures were standardized. A control was achieved by having each of the two classes on a grade level alternate in taking planned and unplanned trips. Tests, which had been prepared by the hosts, were administered to both prepared and unprepared groups on the day following the field trip. Two weeks later the identical test was administered to evaluate retention.

It was found that there was a highly significant difference of group means in favor of the planned field trip on both the follow-up and retention tests. In every instance the control group, which had not taken the field trip, scored far below both the prepared and unprepared classes. It was noted by teachers, students and hosts that there were many other advantages for the carefully planned field trip in addition to higher scores for prepared groups on the information tests.

With the advantages of the planned educational field trip shown clearly, general guides were formed to aid in the development of the educational field trip. Guides were included for the school system, the teacher, the host, and the chaperone.

Among the recommendations resulting from this study were:

- 1. That additional research be conducted in every phase of the educational field trip including study of the educational achievement of children participating and not participating in field trips, determination of ways to make the host's part in the field trip more effective, study of the value of vicarious field trips through resource persons, further study of more effective ways to plan the educational field trip, and a study of system-wide policies concerning field trips.
- 2. That the field trip booklet developed in the study be evaluated for later revision, that it be used as a reference in formation of booklets for other systems, and that guides to effective field trip usage be included in future booklets.
- 3. That all teachers be encouraged to use the educational field trip as part of the curriculum, utilizing the hosts for classroom visits, planning the field trip, and studying and adapting guides for field trip usage to the local situation.
- 4. That community leaders take the initiative in planning and encouraging well-prepared educational field trips for school classes.

Microfilm \$2.55; Xerox \$8.80. 194 pages.

A MATHEMATICAL STUDY OF THE UTILITY OF SELECTION DECISIONS BASED ON TEST SCORES

(L. C. Card No. Mic 59-627)

S. David Farr, Ph.D. Syracuse University, 1958

The objective of this research is to study the effect of certain parameters on the quality of selection which can be done using the information provided by test scores. Test parameters under consideration are the length of test, item difficulty, item accuracy, and covariance between the items. A fifth parameter is the way in which test scores are used to reach decisions. It is labeled "strategy."

Since traditional measurement theory does not provide

an adequate concept for evaluating the selection process, the concept of utility has been borrowed from mathematical decision theory. Utility is defined for selection as the benefits resulting from correct selections, minus the losses resulting from incorrect selections, minus the cost of the information on which the decisions are based. Only decisions between the alternatives "select the individual" and "reject the individual" were considered. The assumption was made that a single value could represent the benefit derived from each correct decision to select and another single value the loss resulting from each incorrect decision to select.

The expected score distribution for over 250 hypothetical tests with specified test parameters were constructed. The results of applying the various possible strategies to these distributions were evaluated with utility as the criterion.

Both test length and item accuracy are directly related to utility. For both parameters, however, there is often a point beyond which the increase of the parameter will no longer result in an increase of utility. Also, it is possible in many cases to compensate for a deficiency in one of these test parameters by increasing the value of the other. That is, a specified degree of utility can be achieved through various combinations of item accuracy and test length.

Inter-item covariance generally acts as a suppressor of utility. Other things being equal, when covariance increases, utility decreases. There is little difference in the quality of selection decisions which can be made as the item difficulty takes on varying values.

When a test with specified parameters is to be used in a specified situation, it is possible to identify, through a function of the expected distribution, the strategy which would be expected to produce the greatest utility. Another function is presented which defines the limits of "admissible" strategies for a specified situation, that is, those strategies which will produce greater utility than will random selection.

By studying the selection problem through the concept of utility of decisions it is possible to come to more exact conclusions as to the effect of the parameters under study on the quality of selection. This approach could be applied, as it has in a mathematical approach by Cronbach and Gleser, to other problems involving the use of tests.

Microfilm \$2.55; Xerox \$8.80. 194 pages.

THE "DO-IT-YOURSELF" MOVEMENT IN PULASKI COUNTY, ARKANSAS, AND ITS IMPLICATIONS FOR INDUSTRIAL ARTS

(L. C. Card No. Mic 58-7427)

Viron Nelson Hukill, Ed.D. University of Missouri, 1958

Supervisor: Dr. H. H. London

Purpose of Study: The purpose of this study was to ascertain the scope and extent, and the motivating factors of the Do-It-Yourself movement in Pulaski County, Arkansas, in the areas of home maintenance, repair, alteration, and construction, and to point out the curricular implications for industrial arts.

Method of Research: Screening double postal cards were sent to two thousand persons whose names were obtained by taking each consecutive twenty-sixth male name and address from the Pulaski County 1956 Numerical Listing of Passenger Car Registrations. Data for the study were obtained from 201 Information Forms received from those qualifying as "Do-It-Yourselfers."

<u>Summary:</u> A majority of the "Do-It-Yourselfers" were between the ages of thirty and forty-nine, had been engaged in this work fifteen years or longer, were from the three upper occupational groups as classified by the 1949 Dictionary of Occupational Titles, and had incomes between \$3,000 and \$6,999 annually.

The mean number of hand tools possessed was 32, and by far the most popular power tool was the electric hand drill, with 72 per cent possessing this tool.

Of the power tools "Do-It-Yourselfers" planned to buy, the table saw ranked first.

A majority of the respondents had spent less than \$100 for hand and power tools during the three-year period prior to the study.

Of the seven major areas of activity performed by the "Do-It-Yourselfers," more had been done in the area of painting, papering, and finishing. In descending order of extent of activity, the remaining six areas were:

Electrical
Carpentry
Furniture and cabinet making
Plumbing
Concrete, plaster, and masonry
Metalwork

A desire for instruction in these activities was expressed by 77 per cent, and 72 per cent thought such instruction should be offered by public schools in the community.

A majority were performing jobs alone, and had received practically no help and assistance in learning how to do them.

"Do-It-Yourselfers" were motivated primarily by economic reasons; psychological reasons ranked second, and health and leisure time reasons ranked third. Advertising did not prove to be effective as a motivational factor.

Conclusions: Active participation in Do-It-Yourself work is most commonly found in the age group of thirty to forty-nine, and a large per cent of the participants are from the three upper occupational groups.

"Do-It-Yourselfers," on the average, are likely to possess sufficient hand tools for jobs they perform, and have at least two pieces of power equipment. They are likely to possess an electric hand drill, or be contemplating the purchase of one.

People are saving a considerable amount of money by performing Do-It-Yourself jobs.

More jobs are being performed in the areas of painting, papering, and finishing, electrical work, and carpentry, than in any other, and less in mentalwork.

A majority of Do-It-Yourself jobs are performed by people working alone.

People are motivated in Do-It-Yourself work primarily by economic and psychological reasons, and very little by advertising.

"Do-It-Yourselfers" are having more difficulties in

plumbing and concrete, plaster and masonry jobs than in other areas.

Instruction should be made available through local high schools for adults who are interested in learning more about maintenance, repair, alteration, and construction jobs in and around their homes. Similar instruction should also be made available to secondary students since a majority will soon become home owners or renters and thus face the same problems now faced by adults. Microfilm \$2.00; Xerox \$6.60. 138 pages.

GRADUATE ACCOUNTING EDUCATION FROM 1926-1955

(L. C. Card No. Mic 58-7620)

Arnold Kaufman, Ph.D. New York University, 1958

Chairman: Professor Peter L. Agnew

This study is concerned with the history of graduate accounting education from 1926 through 1955. In this connection the following areas were investigated: (1) the factors that have contributed to the development of graduate accounting education, (2) the emphasis placed upon broad or specialized graduate accounting instruction, (3) the relationship between undergraduate, masters and doctoral programs of accounting study and (4) suggested educational standards for future graduate accounting training.

The data were obtained from (1) primary sources, comprising the catalogues of undergraduate and graduate schools of business, the reports of professional committees on education and the surveys and questionnaires undertaken in accounting education; and (2) secondary sources, consisting of the periodicals (mainly The Accounting Review and The Journal of Accountancy), the publications of professional associations and societies and other works in accounting education.

The following conclusions have been derived from this study:

- 1. The masters thesis is being deemphasized in favor of term or other special research projects which are made a part of the regular course work.
- 2. The trend in the last decade has been toward integration, rather than specialization, as a philosophy of graduate accounting instruction.
- 3. Institutions which grant a masters degree can be divided into two groups: (a) the strictly graduate institutions which require an undergraduate degree for admission (e.g., Harvard, Stanford) and (b) the graduate divisions of undergraduate schools (e.g., Wharton, Boston and Pittsburgh).
- 4. The case study method of instruction has been popular on the graduate level, particularly in seminar courses where the emphasis is on the why rather than the methodology of a problem.
- 5. The PhD had traditionally been a degree taken only by teachers and those interested in a career in research. In the last decade, this condition has

- changed and persons pursuing careers in the business world have undertaken doctoral programs.
- 6. The traditional PhD requirements of written language examinations in French and German have been amended in favor of tests in two other foreign languages or one foreign language and statistics.
- 7. The following requirements are typical of the majority of doctoral programs in business: (a) oral and written examinations in four or five fields of business; (b) written tests in two foreign languages, with statistics frequently permitted as a substitute for one of the foreign languages and (c) a dissertation.
- 8. In the last decade, universities have been encouraging students taking doctoral programs in business to pursue fields of study offered in colleges of the university outside of the graduate school of business. This is a further illustration of the popularity of the philosophy of integrated graduate business study during the period 1946-1955.
- 9. The majority of the doctoral programs presently being offered in business are in either business administration or economics, with accounting constituting one of the four or five fields of study pursued.
- 10. The proposal for a professional school of public accounting is not a new one, having been seriously discussed approximately twenty years ago.
- 11. College deans are the principal group opposing the creation of professional schools of public accounting.
- 12. The report of the Commission on Standards of Education and Experience for Certified Public Accountants has revived the discussion of separate professional schools of public accounting. The establishment of such institutions is presently being more seriously considered than ever before.

Microfilm \$2.70; Xerox \$9.40. 208 pages.

THE CRITICAL REQUIREMENTS FOR PRIVATE SECRETARIES BASED UPON AN ANALYSIS OF CRITICAL INCIDENTS

(L. C. Card No. Mic 59-719)

Eugene John Kosy, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor Russell J. Hosler

This study is an attempt to determine the critical requirements for the effective performance of private secretaries based upon an analysis of effective and ineffective critical incidents as observed by executives and their private secretaries.

The purpose of this research project are (1) to determine the effective and ineffective behaviors of private secretaries as revealed by a self-analysis and self-report; (2) to determine the effective and ineffective behaviors of private secretaries as revealed by the observations of

executives; (3) to determine how the effective and ineffective behaviors of private secretaries relate to the generally accepted lists of job requirements or duties of secretaries; and (4) to determine the critical requirements for successful private secretaries.

In addition to securing data directly related to the above purposes of the study, information was secured with respect to the population of the study. These data on the population were concerned with the sex, age, salary, experience, and education of the private secretary and the executive who reported the critical incidents for this study.

An adaptation of the research method known as the critical incident technique was used in this study. In order to determine the critical requirements for the effective performance of private secretaries, an executive and private secretary from each of fifty manufacturing firms located in Seattle, Washington were interviewed. The observers were asked through the personal interview to report actual behaviors of private secretaries, behaviors which had been observed to be critically effective or ineffective in a given situation. These interviewees were also asked to complete a data sheet which provided the researcher with personal data about the observers themselves.

The interviews produced 352 usable incidents.

When comparing the findings of this study with other generally accepted lists of duties of the secretary, it was noted that no new duties became evident but many of the existing duties of the private secretary could not be considered as critical.

Twenty-nine critical requirements for the successful private secretary were developed from the critical secretarial behaviors.

The final analysis of the study consists of a comparison of the critical requirements for the successful private secretary and the duty assignments of the critical incidents. This analysis indicates that some of the critical requirements relate to only one job situation while other critical requirements permeate more than one job situation.

Microfilm \$4.55; Xerox \$15.40. 356 pages.

EMPLOYMENT REQUIREMENTS AND OPPORTUNITIES FOR WOMEN AS TECHNICIANS IN THE ST. LOUIS LABOR MARKET AREA

(L. C. Card No. Mic 58-7429)

Joseph Junior Littrell, Ed.D. University of Missouri, 1958

Supervisor: H. H. London

Purpose of Study: The purpose of this study was to ascertain the occupations in which women were working as technicians in the St. Louis labor market area, the personal and professional qualifications required for employment, future opportunities, and what employers consider advantages and disadvantages in hiring women as technicians.

Method of Research: Four hundred thirty-one establishments having over 100 employees, were contacted in the St. Louis metropolitan area to ascertain whether or not women were employed as technicians. Afterwards,

persons familiar with employment requirements and opportunities for technicians were interviewed, guided by an interview form, in sixty-seven establishments employing women technicians. The interview form contained questions relating to the aforementioned purposes of the study pertaining to employment requirements and opportunities for women as technicians.

Summary: Most of the establishments contacted employed technicians, but few employed women technicians. Most women technicians were employed in medicine and other health services, transportation equipment and chemical and allied products industries.

A large percentage of the 753 women technicians found were employed as medical technicians, chemist assistants, assistant engineers, scientific helpers, X-ray technicians, and draftsmen in support to enginners, scientists, and medical doctors.

Technical institute graduation or some college work were common requirements for initial employment as technicians. Completion of courses in mathematics, chemistry, physics, or drafting were the most common subjects necessary for women technicians to obtain employment.

A large percentage of employers indicated that they had no preference for either men or women but hired the best qualified persons as technicians. Employers preferred to hire younger women for technician's jobs and train them on-the-job. Race, marital status, and previous work experience were not important factors in regard to the employment of women technicians.

Failure to remain with establishments and problems connected with promotions were considered main disadvantages in employing women in technical occupations. Chief reasons why women leave technical employment were marriage, pregnancy, and moving with family.

Although only a few additional technicians were needed at the time of the study, by 1961 employers expected to increase their number of technical employees by 14 per cent with an additional 10 per cent needed for replacements. Most of the additional technicians needed by 1961 were expected to be in establishments employing larger numbers of persons. Expected additional technical personnel needed included chemist assistants, detailers, medical technicians, and production illustrators.

Conclusions: While only a few of the large employers of labor in the St. Louis area hire women technicians, the outlook for employment of such workers is favorable. If anticipated needs are met, there will be an increase in the number of technical positions during the next three years. Women technicians will find the best opportunities for employment in the larger establishments as chemist assistants, detailers, medical technicians, engineering assistants and production illustrators. Acceptance of women technicians in the durable manufacturing industries would probably greatly increase women's opportunities.

Employers hiring women in the technical occupations find it economical to employ them to relieve enginners, scientists, and doctors of considerable computative, testing, and routine work.

Girls and women who are interested in and have the ability to do technical work are more likely to obtain employment as technicians if they are graduates of technical institutes or have had two years of college where they have satisfactorily completed courses in mathematics, chemistry, physics, or drafting.

Microfilm \$2.05; Xerox \$7.20. 154 pages.

THE DEVELOPMENT AND TRY-OUT OF A SET OF CRITERIA FOR THE EVALUATION AND IMPROVEMENT OF A CONSERVATION EDUCATION PROGRAM IN AN ELEMENTARY SCHOOL

(L. C. Card No. Mic 58-7768)

Clarence John Messner, Ed.D. University of Michigan, 1958

The purpose of this study is to develop a set of criteria which may be used to evaluate and improve a conservation education program in the elementary school. The criteria were developed from such experiences and activities as reading the literature, observing conservation programs in action, conferring with conservation leaders and participating in the work of the Committee on Conservation and Education which is sponsored by the Michigan Department of Public Instruction.

Conservation is defined as the wise use and effective management of all of our resources, natural, social and human, for the greatest number of people and over the longest possible time. Conservation education is understood to be the sum total of educational experiences promoting the proper skills, knowledge, attitudes, appreciations, interests and behavior along conservation lines.

The criteria developed in this study, twenty-nine in number, were organized into a form so that they could be appraised for critical importance by a jury of conservation educators. Each of the criteria was described and qualified by several substatements in order that the key statement or criterion might be clearly understood. The criteria were rated on a five point scale by a group of eighteen nationally known conservation educators. For purposes of comparison a Michigan group of twenty-four also evaluated them. Nearly all of the criteria were considered to be of major importance by the rating team.

The criteria were then organized into a Checklist. This instrument consists of the twenty-nine criteria and 300 substatements. The substatements include comments on conservation principles, concepts, methods, materials of instruction, and school practices, all categorized by the criteria. It has a five point rating scale. It was tried out by a group of six Michigan elementary schools and intensively in the Richard School, where the author is the principal. It was critically examined by a small group of persons having a conservation interest.

The study makes note of the crucial nature of the problem of resource-use in the nation. Our country has a rich heritage of natural resources. Through the years there has not always existed the proper understanding of the place that this resource base plays in our social and cultural economy. The idea that man should take a position of stewardship toward this rich storehouse of natural resources is one which needs to be inculcated. Education for the wise use and effective management of all of our resources becomes a prime necessity.

It was concluded from the study that conservation is not

easy to measure because a good program is one that is well integrated into all phases of the curriculum. The real effects of a program of instruction can be determined only in the distant future as marked by the status of the resource base at that time. There was considerable agreement on what the characteristics of a good program are, as determined by the common acceptance of, and high ratings given the criteria by the conservation educators who made up the jury. The Checklist can be used to measure a program of conservation in an elementary school. A curriculum committee can use the instrument profitably to improve the instructional program in this field. The teacher can use it as a list of suggestions for good conservation practices in the classroom. The use of the appraisal device presents a challenge and an incentive to a school to do the best possible job with boys and girls in this important area of learning. Microfilm \$2.50; Xerox \$8.80. 192 pages.

A COMPARATIVE STUDY OF EXOGENOUS AND ENDOGENOUS MENTALLY RETARDED BOYS ON SOME ASPECTS OF THE READING PROCESS

(L. C. Card No. Mic 58-7231)

Donald Young Miller, Ed.D. Syracuse University, 1958

A review of the literature revealed a need for further study comparing the educational achievement of exogenous and endogenous mentally handicapped children. The reported findings of past research indicated no significant differences in the arithmetic achievement of the two groups. The purpose of the present study was to investigate these aspects of the reading process: silent and oral reading achievement, pattern of reading errors, and auditory and visual perception techniques. These were measured by means of the following tests: California Achievement Tests, Gray Oral Reading Paragraphs Test, Iota Word Test, Monroe Word-Discrimination Test, Gates Auditory Techniques Tests (Blending Letter Sounds, Giving Words--Initial Sounds, Giving Words--Final Sounds), Gates Visual Perception Techniques (Reading Capital and Lower Case Letters.

Groups of 29 exogenous mentally handicapped subjects and 29 endogenous mentally handicapped subjects were matched on the basis of mental ages which were within the limits of 7 through 12 years inclusive; intelligence quotients which were within the limits of 50 through 85; and chronological ages which were not more than 22 years. The diagnosis of exogeny or endogeny for each case was established by means of the Riggs and Rain classification system and by the number of background responses made by the subject on the Syracuse Visual Figure-Background Test.

Five hypotheses were proposed about the quantitative and qualitative performance on the reading tests by the exogenous and endogenous mentally handicapped subjects. These hypotheses were supported by the results of this investigation with the exception of the one pertaining to the pattern of reading errors. This hypothesis was only partially supported since the groups differed significantly on two of the ten error-types. The following conclusions seem justifiable from the investigation:

- 1. Exogenous mentally handicapped subjects do not differ significantly from endogenous mentally handicapped subjects in silent reading achievement.
- 2. Exogenous mentally handicapped subjects do not differ significantly from endogenous mentally handicapped subjects in oral reading achievement.
- 3. Exogenous mentally handicapped subjects do not differ significantly from endogenous mentally handicapped subjects in auditory techniques.
- 4. Exogenous mentally handicapped subjects do not differ significantly from endogenous mentally handicapped subjects in visual perception techniques.

These conclusions are restricted to populations characteristic of the present sample and to the aspects of reading achievement assessed by the techniques employed. Broader interpretation must await subsequent studies utilizing more extensive populations and measures of reading achievement. Of particular interest would be the evaluation of the reading process of younger groups and groups which attend special classes in the public schools. Also important for further investigation is research pertaining to personality and behavioral characteristics of exogenous children and their effect on the learning processes and achievement in the various academic areas. Upon the completion of such studies, the advisability for modifying the special education program for all or certain of the exogenous mentally handicapped group might better be determined.

Microfilm \$2.00; Xerox \$5.60. 111 pages.

A LONGITUDINAL STUDY OF MENTAL TRAITS IN ELEMENTARY SCHOOL CHILDREN

(L. C. Card No. Mic 59-633)

Harry Samuel Novack, Ph.D. Syracuse University, 1958

The question of whether Garrett's theory of differentiation can be applied to children below the age of 12 years has remained controversial and unanswered. The intent of this investigation was to study the mental organization of a group of school children in grade I and again in grade VI for the purpose of observing whether specialization of abilities takes place during the primary and intermediate grades. A secondary purpose of this investigation was to observe the extent to which scores from factorially constructed tests of mental ability given in the first grade correlate with meaningful criteria several years after testing.

Selected for subjects were 360 children considered to be comparatively homogeneous as to chronological age, race, grade placement, and educational background. This group received the following tests during a five-year period of observation:

Grade I - SRA Primary Mental Abilities for Ages 5-7

Grade IV - Durrell-Sullivan Reading Achievement Test

Grade V - Iowa Test of Basic Language Skills

Grade VI - SRA Primary Mental Abilities for Ages 7-11 SRA Primary Mental Abilities for Ages 11-17

On the basis of some of the data reported in past studies and certain a priori considerations, hypotheses

were proposed concerning changes in relationship among individual mental factors and between clusters of verbal and non-verbal factors at the first and sixth grade levels. Additional hypotheses were proposed dealing with the predictability of fourth grade reading achievement and fifth grade language skills performance through the use of verbal and non-verbal ability clusters. The obtained data were analyzed for the total group and for each of subgroups comprised of males, females, children 76 months of age and older, and children 75 months of age and younger. Results appear to justify the following conclusions:

- No evidence favoring the differentiation hypothesis
 of the effect of age on mental organization was found
 in comparisons of the mean interrelationships of
 the SRA Primary Mental Abilities at grade I and at
 grade VI.
- 2. No differentiation was observed in comparisons of the mean relationship of the Verbal-meaning factor with the other factors of the SRA-PMA batteries at grade I and at grade VI.
- Partial support for the theory was found in the differentiation of the Perceptual and Spatial factors from the other test components.
- 4. Differentiation for the Perceptual factor was not related to sex or to variability of age within the total group.
- 5. The change in relationship of the Spatial ability with the other test components was greater for the females than for the males. The change was equally apparent for the children who were 75 months of age and younger and those who were 76 months and older.
- 6. The decrease in relationship between the Verbalmeaning and Perceptual factors appears to have been a consequence of the differentiation for the Perceptual factor.
- 7. Comparisons between first and sixth grade correlations for verbal and non-verbal ability clusters showed no decrease with time.
- 8. After five years, measured verbal performance was found to be more consistent than measured non-verbal performance. This was most evident for the female group.
- 9. As was expected on a <u>priori</u> gounds, verbal performance was a better predictor of reading and language skills achievement than was non-verbal performance. This was more evident for females than for males and for the younger group than for the older group.

The cause and the significance of such differentiation as has been found await further clarification. Although maturation undoubtedly has much to do with the differentiation process, future investigations need to determine the effect that increasing experience, schooling, and intelligence have on changes in mental organization. The implications of the differentiation of abilities for differential testing and for the prediction of scholastic achievement remain to be determined through further progress in the development of mental ability tests and through the validation of such tests in specific situations with meaningful criteria.

Microfilm \$2.00; Xerox \$6.00. 121 pages.

A SOCIO-ECONOMIC STUDY OF COLLEGE WOMEN

(L. C. Card No. Mic 59-81)

Florence Louise Phillips, Ed.D. Indiana University, 1958

Chairman: Kate Hevner Mueller

The purpose of this study was to analyze the relationship between socio-economic status and selected individual characteristics and behavior of 1,352 undergraduate women students attending Texas Technological College. The factors considered were college residence, size of home town, college class, marital status, employment, education of parents, school or division, major subject, cumulative grade-point average, extra-curricular participation, and fraternity membership. These data were obtained from official college records of women students enrolled during the spring semester of 1956-57 who were carrying a minimum of 12 hours of course work, and who were residents of the State of Texas.

The major assumption of the investigation was that actual college attendance is related to socio-economic status as defined by father's occupation. A second assumption was that the above named items of personal data, with the exception of cumulative grade-point average, are related to socio-economic status.

The socio-economic classification used in this analysis was a modified form of the socio-economic scale developed from the 1950 census. Using census data, comparisons were made between the occupations of the fathers of students, and the occupations of employed men in the State of Texas.

After the fathers' occupations were classified and related to the selected factors under consideration, percentages and indices of representation were computed. The chi square test was used to determine the significance of the findings.

Conclusions

The tests that were made of the assumptions demonstrate that the first hypothesis is correct. A close relationship does exist between socio-economic status and college attendance. The statistical analysis of the data does not support all of the assumptions included in the second hypothesis for there are varying degrees of the significance of the relationship between fathers' occupations and the behavior characteristics of the students. The most significant relationship exists between socio-economic status and father's education, size of home town, mother's education, sorority membership, activity participation, school or division, employment, college residence, and college class. The findings are not significant regarding marital status, academic achievement, and major subject.

Further conclusions may be drawn from the analysis of the data. First, representatives of each socio-economic group enroll in college, but in different proportions. This research and many other studies have shown that socio-economic status is related to college attendance. Blue-collar workers are consistently under-represented in college enrollments, while white-collar groups are over-represented.

Second, a high proportion of the women students who enter Texas Technological College either do not complete

their education, or transfer to another college. Students from farming and clerical families were the only socio-economic groups over-represented in the senior class.

Third, the median grade-point average for the professional group was 1.58, and the median for the semi-skilled and unskilled groups was 1.38. These averages would have more meaning if scores were available for the American Council on Education Psychological Examination.

Fourth, students from the upper socio-economic groups participated to a greater extent in the extra-curricular activity program sponsored by the college than did the lower groups. The participation of the various socio-economic groups may reflect the orientation and interests of their parents.

Fifth, 36 per cent of the women students belonged to national social sororities. White-collar students were over-represented in the memberships of these organizations, while farming and blue-collar students were underrepresented. Since sorority groups attract a larger proportion of students from the upper classes, it is possible that if sororities were not affiliated with Texas Technological College, many of these students might choose to attend another college.

Microfilm \$2.00; Xerox \$5.40. 107 pages.

A PROGRAM OF INDUSTRIAL ARTS FOR JUNIOR
HIGH SCHOOL GIRLS IN NEW YORK CITY:
AN ANALYSIS OF PAST AND PRESENT PROGRAMS
WITH A RECOMMENDED COURSE OF STUDY
REFLECTING THE AIMS AND
OBJECTIVES OF EDUCATION
(PART ONE - THE RESEARCH
PART TWO - COURSE OF STUDY.)

(L. C. Card No. Mic 58-5657)

Bernard Francis Rappaport, Ed.D. New York University, 1958

Chairman: Professor Robert L. Thompson

When one considers that the purpose of education in our society is to teach children about our way of life, which is predominantly industrial by nature, and to prepare children for that way of life, it is evident that some education in industrial methods, techniques, and related information is necessary. A comparatively few educational systems have attempted a program of industrial arts for girls, but these have not followed any specific pattern as to areas covered or material included in the course of study. It is the purpose of this study to develop a course of study in industrial arts for girls in the junior high schools of New York City.

The research is in two parts: (1) A justification of a program of this type in the light of the objectives of education; a survey of past and present programs of industrial arts for girls in public and private schools; and the problems of organizing a program of industrial arts in the junior high schools of New York City; (2) A recommended course of study for junior-high-school girls in New York City.

Pertinent data were gathered from literature illustrating the general congruence of the objectives of industrial arts and those of general education. Data concerning

women in industry were gathered from recent census figures, and information on incidence of home maintenance problems was gathered through surveys and discussions with responsible individuals in the field. A survey of the forty-eight State Departments of Education and the one hundred cities in the United States of America which have over 100,000 population gave the names of schools or school systems which offer industrial arts programs for girls. These programs were surveyed for educational content and general administration procedures. All public schools in New York City which have industrial arts for girls were surveyed as were the seven private schools in New York City with similar programs. Administrators, supervisors, and teachers in New York City schools were interviewed with a view to determining the problems inherent in organizing a program for girls in the industrial arts area. The results of these readings, discussions, interviews, and observations were used as a guide to setting up the recommended program of industrial arts for girls in the junior high schools of New York City.

Evidence indicates that there is a need for direction in the organization of industrial arts programs for girls not only in New York City, but all over the country. While the emphasis in this study is on the New York City program, the findings are suitable for use as a guide by all those administrators and supervisors who desire to incorporate a program of industrial arts for girls in their own school systems.

Microfilm \$3.25; Xerox \$11.00. 249 pages.

A STUDY OF THE RELATIONSHIP BETWEEN EMOTIONAL ADJUSTMENT AND SCHOOL CITIZENSHIP

(L. C. Card No. Mic 59-315)

Emma J. Reinbold, Ed.D. Temple University, 1958

The Problem and Its Importance

The purpose of this investigation was to determine the existence of a relationship, if any, between emotional adjustment and school citizenship as measured by the California Test of Personality and selected citizenship criteria.

Because of the urgency of the current problem of school citizenship, workers in the field of education and a large proportion of our population consider desirable school citizenship behavior an important goal in the total educational process.

Problems of mental health are receiving increasing attention as evidenced by the growth in number of guidance and study centers, the inclusion of courses in social living at the high school and the college levels, and the augmentation of guidance facilities in elementary and secondary schools.

Background of the Problem

Although much research has been conducted in the areas of emotional adjustment and school citizenship, there seems to be none which completely approaches the nature of this investigation. A number of studies do seem to imply the existence of a relationship between personal-social adjustment and behavioral tendencies considered characteristic of good school citizenship.

A major outcome of the Detroit Citizenship Study was

the theory that emotional adjustment is a key determiner of the quality of school citizenship. Dimond states that poor citizenship is frequently a mental health problem. Undesirable behavior on the part of youth seems to be partially a result of a lack of love and affection and an inability to win friends.

Research conducted by Marks, Baron, and Bonney indicates that certain components of a healthy emotional adjustment: social skills, the ability to extent status to others, and a sense of personal worth seem to be positively related to an individual's ability to attract social choice.

Procedure in the Solution of the Problem

The California Test of Personality was administered to 442 tenth-grade pupils in the Reading High School in Reading, Pennsylvania. Two major-subject teachers of each pupil in the total population rated an assigned group of pupils on a five-point citizenship rating scale constructed by the investigator. Personal, social, and personal-social adjustment scores and citizenship quotients were computed for each member of the total population. A random sample of 200 pupils was selected.

Statistical procedures employed consisted of the computation of Pearson r's to test for relationships between all citizenship quotients and total personal, social, and personal-social adjustment scores. Arithmetic means of correlated scores on the instruments used were compared with the percentile norms on the California Test of Personality.

Another procedure employed was a study of the cumulative records of the 15 pupils with the lowest citizenship quotients.

Summary

The test for statistical significance of the obtained Pearson r's between personal and personal-social adjustment scores and all citizenship quotients revealed no statistically significant relationship between these factors. However, the obtained value of the Pearson r between social adjustment and all citizenship quotients was found to be statistically significant at the one per cent level of significance.

The correlation procedures employed revealed no clearcut results in the direction of a statistically significant difference between the means.

The study of the cumulative records of the 15 pupils with the lowest citizenship quotients showed that in slightly more than 85 per cent of these cases, poor citizenship behavior had occurred in the presence of patterns of poor emotional adjustment.

Conclusions

It may be concluded on the basis of these data, to the extent that this sample is representative of tenth-grade populations and with the specific measuring instruments used, that there is a statistically significant relationship between a pupil's level of social adjustment and the quality of his school citizenship. Within the limits of this investigation, there is no statistically significant relationship between a pupil's levels of personal and personal-social adjustment and the quality of his school citizenship.

Microfilm \$2.00; Xerox \$4.80. 93 pages.

OPINIONS OF HIGH SCHOOL SENIORS TOWARD RECENT PROPOSED CHANGES IN AMERICAN EDUCATION

(L. C. Card No. Mic 58-7993)

Arlo Leonard Schilling, Ph.D. Purdue University, 1958

Major Professor: Paul Alexander

This study is an endeavor to systematically appraise the opinions of high school seniors in the state of Indiana, toward recent proposals for change in American education. The study attempts to answer three questions: (1) how do seniors feel toward major proposals for change in American education? (2) to what extent are the respondents favorable or unfavorable toward each proposal for change in American education? and (3) what is the relationship of selected background factors to the opinions of high school seniors toward the proposals for change in American education.

The sample of this study consists of approximately five percent of the total high school senior population enrolled in high schools in Indiana during the 1957-58 school year, the sample being stratified on the basis of school size and geographical region. All data in this investigation were obtained by administering an information schedule and opinionaire. Respondents were asked to indicate the following: sex, curriculum, socio-economic status level, school marks, future plans, mother's education, residence (rural-urban status) geographical region and school size. Fourteen major proposals for change in American education were presented for consideration by the respondents, they were asked to indicate strongly agree, not sure, probably agree, not sure, probably disagree, or strongly disagree. An index of favorableness toward each proposal was determined by assigning values of four, three, two, and one respectively to the responses toward the proposals. The rank and index of favorableness for each proposal was obtained.

The data, tabulated by frequency and percentages, were presented in table form with a brief summary of the findings presented after each table.

The high school seniors expressed a high degree of favorableness toward seven proposals; importance of academic achievement, a scholarship program, regularly assigned homework, basic general education, a nation-wide testing program, national standards for a high school diploma, and a speaking knowledge of a foreign language.

Five proposals received somewhat fewer expressions of favorableness, but still a majority, they were: ability grouping, multiple-diploma plan, greater emphasis on fundamental subjects, students progress at own speed, and Standard and Honor high schools.

Two proposals were rejected by the high school seniors, one, proposing a thirteenth year of school for vocational training, and the other, proposing a lengthened school term, received approximately 75 percent expressions of unfavorableness.

The selected background factors reveals that, generally, girls express greater favorableness than boys, pupils in the academic curricula are more favorable, pupils with higher school marks, definite future plans and a high level of education for mother, express more favorableness.

The one thousand nine hundred and forty-five Indiana

high school seniors express considerable favorableness for a more rigorous program of secondary education.

Microfilm \$2.00; Xerox \$6.40. 133 pages.

A STUDY OF SOME FACTORS INVOLVED IN NEW YORK STATE SECONDARY SCHOOL SCIENCE INSTRUCTION IN CONNECTION WITH RESULTS OBTAINED BY STUDENTS IN STATE REGENTS EXAMINATIONS IN BIOLOGY, CHEMISTRY AND PHYSICS

(L. C. Card No. Mic 58-7240)

Thomas Donald Sheldon, Ed.D. Syracuse University, 1958

Supervisor: Alfred T. Collette

The purpose of this dissertation was to find out whether there were significant differences inteacher factors, class-room procedures, or general educational background of classes which were relatively successful in regents examinations in biology, chemistry, and physics as compared with classes which achieved less success in these examinations. At the same time the information gathered concerning these factors provided a good insight into the training, attitudes, and practices of a large number of instructors of science regents classes in the years 1951, 1952, and 1953.

The New York State Education Department's bound principals' summaries for the June regents of the above years were utilized to compute the percentage of each individual teacher's pupils passing the biology, chemistry, and physics final examinations. These pass-fail scores were then used to set up "most success," "average success," and "least success" regents class categories.

The names of twenty teachers in each success category for each subject and each year were then drawn randomly from a listing of all science regents teachers still in service in 1954, and a 51-item questionnaire was sent to each person selected. In this manner a total of 540 responses was solicited, 398 eventually being returned to the writer for analysis. After elimination of replies from schools where pupils were in some manner selected to try regents, or where the teacher responded in effect that the class was composed largely of students either superior or inferior in academic ability, 300 remaining responses were actually utilized in the study. Chi-square and t-ratio techniques were employed to determine the significance of differences in responses to each questionnaire item with respect to the success categories previously set up. The study noted that while the approach used did analyze differences in individual background factors of the classes with respect to regents success, the lack of factor control made it impossible to ascertain a definite causative relation between any factor and such success. In addition, it was found that the teacher backgrounds and practices employed in the various schools did not differ greatly with regard to most items whether or not the class achieved high or low regents success. Although significant differences were noted in a considerable number of cases for an individual subject in a certain year, most importance was attached to findings

which rather consistently held for all three years and/or for all three subjects.

The most strongly substantiated differences indicated that the more successful regents classes were taught by a teacher who was himself a graduate of a New York State high school, earned an average or above average salary as opposed to a below average salary, had a better background in education courses than the average science teacher, was relatively experienced as a science teacher, and taught a class with a higher rather than a lower pupil enrollment.

The general conclusions also noted that classes of teachers who were regarded as superior raters of regents papers were significantly more successful, but questioned whether or not these "raters" had not been originally designated because of the success of their classes. It was found that teachers and administrators in the schools studied favored the regents examinations as being valuable to the state science education program. A considerable number of schools selected the pupils who were to try regents, thereby raising their school pass-fail record. The dissertation closed with summary statements concerning conditions in the schools with regard to twenty-three different classroom and teacher factors, among them the encouraging fact that most of the science teachers participating in the study would again choose the same profession.

Microfilm \$4.55; Xerox \$15.20. 353 pages.

A STUDY OF THE RELATIONSHIP BETWEEN
PARTICIPATION IN VARIOUS TYPES OF
EXTRA-CLASS ACTIVITIES AND ACADEMIC
PERFORMANCE IN THREE PRIVATE
JAPANESE SECONDARY SCHOOLS

(L. C. Card No. Mic 58-7242)

John Harold Skillman, Ph.D. Syracuse University, 1958

Supervisor: Paul M. Holverson

Purpose of the Study

The purpose of this study was to investigate the relationship between participation in a number of types of extraclass activities and academic achievement, controlling the intelligence factors.

Statement of Hypotheses

- 1. There is a significant difference between the academic achievement of the participants in some types of the extra-class activities in which students engage and the academic achievement of non-participants with intelligence controlled.
- 2. The academic achievement of participants in extraclass activities is significantly different for the various types of extra-class activities in which students engage when intelligence is controlled.
- 3. Academic achievement is significantly higher for the participants in those types of extra-class activities in which improved academic achievement is a more important objective than for the participants in those types of activities in which it is a less important objective.

4. There is no significant difference between the mean achievement of all participators in extra-class activities and the mean achievement of all non-participators.

Summary of Procedures

The subjects of this study were third year students in three private Japanese senior high schools located in Tokyo, Japan.

The three schools were Aoyama Gakuin Senior High School, a co-educational institution; Joshi-sei Gakuin Senior High School, a school for girls; and Meiji Gakuin Senior High School, a boys' school.

The extra-class activities were grouped into four types of activities: (1) student government and class committees, (2) academic or departmental clubs, (3) publications, dramatics, and musical organizations, and (4) special interest clubs.

From 840 third year students, 123 were selected as participants in extra-class activities while 94 were selected as being non-participants. A sample of 194 students was selected including from each school pairs of participants and non-participants matched on the basis of intelligence, age, year and curriculum in school, and socioeconomic background.

Two statistical techniques were used to test the hypotheses. The t-technique was used to test the significance of the difference between the academic achievement scores of the matched pairs of participants in each of the four types of extra-class activities and the non-participants, to test the difference between the means of the participants in the type of extra-class activities in which academic achievement was claimed most and was claimed least as an objective, and to test the difference between the means of all participants and all non-participants. The analysis of covariance technique was used to test the significance of the differences among the mean achievement scores of participants in the four types of extra-class activities.

Summary of Findings

Hypothesis 1 was supported by the data. The academic achievement of the participants in one type of extra-class activity, Type I, was significantly higher than that of the non-participants with whom they were matched. The difference between the means of the participants in the Type I activities and the non-participants was statistically significant at the 5% level of confidence.

Hypothesis 2 was supported by the data. The differences among the mean grade point averages of the participants in the four types of activities were statistically significant at the 5% level of confidence.

Hypothesis 3 was not supported by the findings. The difference between the mean achievement of the participants in the type of extra-class activities which claimed improved academic performance most as an objective and the mean achievement of the participants in the type of activities which claimed improved academic performance least was not statistically significant at the 5% level of confidence.

Hypothesis 4 was supported by the findings. The academic achievement of the participants in extra-class activities was higher than that of the non-participants, but the difference in the means was not statistically significant at the 5% level of confidence.

Microfilm \$2.00; Xerox \$5.80. 116 pages.

A NATIONAL SURVEY OF THE OPINIONS OF BIOLOGY TEACHERS AS TO THE MOST IMPORTANT AREAS IN HIGH SCHOOL BIOLOGY AND AN ACHIEVEMENT TEST IN THESE AREAS

(L. C. Card No. Mic 58-7388)

John Alfred Tyrell, Jr., Ed.D. Boston University School of Education, 1958

The field of biology is far too broad to permit adequate coverage of all of the areas in a high school course, but certainly the most important areas should be adequately covered.

This study had two main objectives. One of these objectives was to determine the most important areas of biology for high school pupils. The other main objective was to construct and administer an achievement test in these areas so that we might have an indication as to how well these areas are being covered in high school biology classes.

In order to determine the most important areas of biology, two surveys were conducted. In the first survey, letters were sent to 2000 members of the National Association of Biology Teachers, asking them to name the one most important and the one least important area of biology. This survey was unusual due to the fact that these teachers were not furnished a list of areas from which they might make their selections, but rather they were given absolute freedom of choice. A total of 931 replies were received and tabulated. It is interesting to note that there was a wide variety of opinions among biology teachers as to the most important areas of biology. In this first survey, there was a total of 64 areas named as most important.

After the replies were tabulated a list was made of the 24 areas most often named as most important. This list was then sent to the 793 teachers who had indicated a willingness to do further work on this study. They were asked to choose, from this list, the three areas which they considered most important and the three areas which they considered to be of least importance. In this second survey, 527 replies were received.

The results were tabulated, and the four most important areas were determined to be: "Biological Principles," "Conservation of Natural Resources," "Essential Life Processes," and "Human Physiology." While three of these areas were clearly defined in nearly all high school biology texts, this was not the case with the area of "Biological Principles." To be certain that this area had an acceptable uniform meaning among biology teachers, a questionnaire was sent to 50 of the teachers who had named the area as most important. The results indicated that there was agreement as to the meaning of "Biological Principles."

An achievement test was constructed in the four most important areas. The material for the test was taken from high school biology texts. Seventy-five biology teachers, located throughout the country, were asked to review the test. No teacher considered the material for any of the items to be too difficult for high school pupils.

The test was administered to 1260 students, with a nationwide distribution.

The tests were scored, and the degree of discrimination and the degree of difficulty of each item were determined.

It was found that for each item, the average per cent of those who could be assumed to know the correct answer was slightly less than 50 per cent. This performance seems inadequate, since the test material was confined to the four biological areas determined to be most important, and since no teacher had claimed that the material for any of the items was too difficult for high school pupils.

In addition to constructing and administering a test in the most important areas of biology, recently published biology texts and tests were reviewed. In general, there was found to be unequal and often meager coverage of these four areas in both textbooks and standardized tests.

Microfilm \$3.05; Xerox \$10.60. 236 pages.

AN ANALYSIS OF A SURVEY OF THE INSTRUCTION OF GIFTED CHILDREN IN GRADES FOUR THROUGH SIX

(L. C. Card No. Mic 59-39)

Jennie V. Visokovicz, Ph.D. University of Pittsburgh, 1958

The purpose of this research was to study the instruction of gifted children in the regular classrooms of certain Pittsburgh Public Schools. Study of instruction involved analysis of (1) pupil achievement and progress in basic academic subjects over a year's span, (2) specific environmental factors in the schools, (3) teaching procedures and techniques in use, and (4) existing problems identified by teachers and by gifted pupils.

Those pupils in grades four through six, with IQ's of 130 and above on the Stanford-Binet Scale and with achievement records for 1955 and 1956, were included in the study.

Data were obtained through interviews with 108 pupils; from questionnaires directed to 42 teachers, 23 principals, and five supervisors; and from school cumulative record cards.

The gifted, studied here, averaged a superiority to grade norms of approximately three and a half years in reading and English and almost two years in arithmetic and spelling on the Metropolitan Achievement Tests. During the 1955-56 school year their average progress was a year and a half and more in reading, English, and arithmetic; and one year in spelling.

In the schools under review, gifted children were not segregated; special programs were limited; acceleration was not widely practiced. The practice generally followed to provide for these gifted pupils was enrichment of the curriculum. Teachers reported little or no use of community resources.

The instructional procedures followed were, in the main, unit teaching, grouping for instruction, and individual instruction. Teacher techniques commonly reported in use were discussion, free-choice activities, extended lesson assignments, and special assignments.

According to the teachers, their most frequent problems relating to gifted pupils were achievement below mental capacity, unavailability of suitable materials, and unsatisfactory relationships of gifted pupils with others. More than 60 per cent of the teachers represented--concerned about their own lack of training and the difficulty of obtaining suitable instructional materials--indicated that they preferred not to work with gifted pupils.

The gifted pupils under study most frequently reported that school problems were long assignments, unsatisfactory pupil-pupil relationships, and distracting class discipline.

Analytic treatment of the questionnaires revealed inconsistencies in the responses of teachers and discrepancies in the reporting on classroom practices by teachers, principals, and supervisors.

The evidence seems to show that teachers had adapted for the instruction of gifted pupils the methods employed for all pupils. Adaptation had been a matter of selecting certain materials and providing particular experiences

for the superior group.

The findings have paralleled other studies on the academic achievement of gifted pupils. More than half of these pupils achieved well beyond grade placement, but others were retarded relative to their capacities as determined by intelligence tests. Except in English progress at the sixth-grade level, where boys surpassed girls, there were no significant differences between the sexes in achievement and progress.

Teacher evaluation of pupil achievement and progress in terms of marks seemed in a disturbing number of instances to differ from the pupil achievement and progress

indicated by standardized tests.

Apparently more materials especially appropriate for gifted children were desired by teachers and pupils. Community personnel and resources available for enrichment of the school experience were admittedly disregarded by teachers.

Problems identified by pupils in this study generally had been unnoticed by teachers and administrators. It seemed, in fact, that activities, selected for gifted pupils, created some of the problems which they reported.

The administrators under review would seem to be faced with the serious necessity of finding ways to encourage more than three-fifths of their teachers to work confidently with gifted pupils.

Microfilm \$2.10; Xerox \$7.40. 159 pages.

A COMPARISON OF THE ACADEMIC PREPARATION AND ACHIEVEMENT OF COLLEGE STUDENTS FROM VARIOUS SIZE HIGH SCHOOLS IN INDIANA

(L. C. Card No. Mic 59-1)

John Frederick Young, Ph.D. Purdue University, 1958

Major Professor: Clarence A. Pound

This study investigated the academic preparation of graduates of various size high schools, and the academic achievement of graduates of various size high schools while in college. The two major hypotheses tested were: (1) When scholastic aptitude is held constant, there is no difference in the academic preparation of graduates from various size high schools, and (2) when scholastic aptitude is held constant, there is no difference in the college academic achievement of graduates from various size high schools.

The sample included 1,240 resident students who entered Purdue University as freshmen in the fall of 1952. The subjects were classified according to four major University schools, namely, Engineering; Science, Education and Humanities; Agriculture; and Home Economics. After

classifying the subjects according to the University school in which they enrolled, the subjects within each University school were categorized into six groups, representing the following high school sizes: Group 1 (0-99 students), Group 2 (100-199 students), Group 3 (200-299 students), Group 4 (300-499 students), Group 5 (500-999 students) and Group 6 (1000 students, or more). Data were obtained from the Purdue University Office of Admissions on the following variables: student number, sex, age, place of residence, school entered at Purdue University, American Council on Education Psychological Examination percentile score, mathematics orientation test percentile score, English orientation test percentile score, physical science orientation test percentile score, first semester index, last semester index, cumulative index, number of times student was on grade probation, number of courses failed by student, number of semesters completed by student, and size of high school from which the student graduated. In testing the hypotheses dealing with academic preparation and with achievement in college, according to high school size, analysis of covariance was used as a statistical method of controlling scholastic aptitude. In testing the hypotheses dealing with the relationship between high school size and number of times students were on grade probation, number of courses failed, and number of semesters completed, the Chi-square test of significance was used. A separate statistical analysis was made for the Schools of Engineering; Science, Education and Humanities; Agriculture; and Home Economics.

The results of the study indicated that there was no significant difference in the mathematics preparation of students entering the Schools of Science, Education and Humanities; Agriculture; and Home Economics from various size high schools. There was a significant difference in the mathematics preparation of students entering the School of Engineering from various size high schools. It appears that students entering the School of Engineering from the larger high schools are better prepared in the area of mathematics than students entering from smaller high schools.

There was no significant difference in the English preparation of students entering the Schools of Engineering; Science, Education and Humanities; and Home Economics from the various size high schools. However, there was a significant difference found in the English preparation of students entering the School of Agriculture from various size high schools. It appears that students entering the School of Agriculture from the larger high schools are better prepared in English than students from the smaller high schools.

There was no significant difference found in physical science preparation of students entering the Schools of Science, Education and Humanities; Agriculture; and Home Economics from various size high schools. There was a significant difference found in the physical science preparation of students entering the School of Engineering from various size high schools. It appears that students entering the School of Engineering from the larger high schools are better prepared in physical science than students entering from smaller high schools.

There was no significant difference found in first semester indices of students entering the Schools of Science, Education and Humanities; Agriculture; and Home Economics from various size high schools. However, there was a significant difference in the first semester indices of students entering the School of Engineering from various size high schools. It appears that students entering the School of Engineering from larger high schools make higher first semester indices than students entering from smaller high schools.

There was no significant difference found in last semester indices, and in cumulative indices of students entering the four major University schools included in this study.

There was no significant relationship between high school size and number of times students were on grade probation, number of courses failed, and number of semesters completed. Microfilm \$2.70; Xerox \$9.40. 208 pages.

EDUCATION, ADMINISTRATION

A DESCRIPTIVE ANALYSIS OF TENTH MONTH WORK IN FLORIDA SCHOOL SYSTEMS

(L. C. Card No. Mic 58-5987)

William Bradley Baker, Ed.D. The Florida State University, 1958

The instructional personnel of Florida public schools is employed for ten months. The attendance year for pupils consists of one hundred eighty days. The remainder of the employment period, approximately one month, is known throughout Florida as the Tenth Month.

The purposes of this study were: first, to analyze, in terms of principles of in-service teacher education, programs and activities used by Florida school systems during the Tenth Month of employment, and second, to report promising practices, used during the Tenth Month of employment, which illustrated principles of in-service teacher education in action.

Five comprehensive principles of in-service teacher education were derived from the literature. Using these principles as guides, sixty-six reports of Tenth Month work in twenty-nine Florida counties, and all available related materials were analyzed to determine planning procedures, program content, activities and practices used by Florida school systems during the Tenth Month. Having determined planning procedures, activities, and practices, Florida school systems were surveyed by questionnaire technique to determine the extent of planning for, and major uses of, Tenth Month time during the 1957-58 school year.

It was found that Tenth Month planning in Florida school systems is the function of a Central Office Committee, a Special Program Planning Committee, or a Tenth Month Planning and Coordinating Committee. The Central Office Committee is representative of the administration almost entirely, and has a continuing responsibility for all activities of the Tenth Month. The Special Program Planning Committee is most frequently representative of both administrators and teachers, and has a short term responsibility usually being dissolved when it has completed planning a single Tenth Month activity. The Tenth Month Planning and Coordinating Committee is representative of all levels of the instructional staff, and has a continuing responsibility for all activities and programs of the Tenth Month.

During the 1957-58 school year sixty-five counties scheduled time for both pre-school and post-school work, and fifty counties scheduled time for work during the school year. The most common practices were ten days for pre-school work, five days for post-school work, and one day for work during the school year. Both pre- and post-school work consisted of countywide conferences and work in the individual school. Work during the school year included parent-teacher conferences and curriculum improvement programs.

Pre- and post-school conferences usually included general session meetings and group work. During the preschool period, work in the individual school involved preparation for the opening of school, faculty planning for the year, department and grade level planning, and planning by the individual classroom teacher. Post-school work at the individual school included completing records, making inventories, ordering supplies, and doing some preliminary planning for the coming year. Generally, work during the school year involved individual school faculty attack on a school-wide curriculum problem. It consisted of faculty study and research, and faculty planning of methods and procedures for improving existing conditions.

It was found that most Florida school systems recognized principles of in-service teacher education during the planning and development of Tenth Month programs and activities. However, it was found that teachers were not as well represented on planning committees as were administrators, nor were they given positions of leadership as often as were administrators.

Microfilm \$2.00; Xerox \$7.00. 148 pages.

A STUDY OF 1956-57 WHITE FLORIDA PUBLIC HIGH SCHOOL GRADUATES ENROLLED IN OUT-OF-STATE INSTITUTIONS OF HIGHER EDUCATION

(L. C. Card No. Mic 58-5988)

Joseph Deas Barker, Ed.D. The Florida State University, 1958

Florida is an educational "debtor" state. Each year, more students emigrate for college than enter from other states to attend Florida colleges and universities.

This study determined the extent of emigration of 1956-57 white Florida public high school graduates and analyzed extent of emigration from counties grouped in three ways: (1) as northern, central, and southern, (2) as counties with low and low-to-medium levels-of-living and counties with medium-to-high and high levels-of-living, and (3) as counties with white student colleges and counties without white student colleges. A major portion of the study dealt with a sample of 419 emigrant students grouped according to academic ability as judged by performance on tests in the Florida Statewide Twelfth Grade Testing Program. These student groups were studied in terms of such characteristics as sex, types of colleges selected, specific colleges selected, fields of study undertaken, length of Florida residence, employment status at college, future residence plans, parents' educational background, family residence history, and occupation of fathers. They were also studied in terms of reasons for emigrating and opinions held of

attended colleges compared with opinions held of the two Florida public universities for white students.

Approximately 28 per cent of the 1956-57 white public high school graduates emigrated for college during the summer and fall following graduation. There was considerable variation among the sixty-seven Florida counties with respect to the extent of emigration. The rate of emigration, expressed as the ratio of emigrant student population to high school graduate population, tended to increase as distance from nearby states increased; it was particularly low in the group of counties adjoining Alabama and Georgia. Generally, the rate of emigration was high in the group of counties with high levels-of-living and low in the group with low levels-of-living. As would be expected, the rate of emigration from college-counties was substantially lower than the rate from non-college counties.

Students in each of the academic ability groups tended to select colleges and universities located in states near Florida. Students in the lower ability groups most frequently selected public four-year institutions. Students in the highest ability group, most of whom were male, tended to select most frequently technological and private four-year institutions. A substantial number of students in each group planned teaching and engineering as fields of study. The percentage of students planning to enter the field of teaching tended to decrease as academic ability increased; the reverse was true with respect to engineering.

Students in each group were influenced strongly in their choice of college by the reputation, quality, and prestige of the selected college, the particular courses and programs offered, guidance and individual help from teachers, and college size. Students in the lower ability groups were influenced particularly by college size, individual help from teachers, and costs of attending college. Students in the highest ability group were influenced particularly by the reputation, quality, and prestige of the selected institutions.

There was considerable evidence that many emigrant students and their parents either know little about the Florida institutions of higher education or else do not hold these schools in high esteem. It would seem that "selling" these schools to the residents of Florida should be of concern at the state level.

Microfilm \$2.00; Xerox \$5.00. 100 pages.

AN ANALYSIS AND SUMMARY OF LITERATURE AND RESEARCH FINDINGS CONCERNING PUBLIC SCHOOL WRITTEN POLICIES

(L. C. Card No. Mic 59-67)

Roger T. Beitler, Ed.D. Indiana University, 1958

Chairman: Maurice E. Stapley

This study is based upon an analysis and summary of the literature and available research concerning public school written policies. The scope of this study was ninefold: historical development of boards of education; policy formulation; legislative, executive, and judicial functions of school officials; rules, regulations, and policies; policy manuals; specialized areas of school affairs; characteristics of and need for policies; status of boards, committee organization, and lay advisory councils; and conclusions and recommendations.

A bibliography was compiled of literature and research written on public school written policies. Copies of doctoral theses were secured through the Inter-Library Loan Service, and microfilm copies of doctoral theses were purchased. Research reports and literature on school administration were collected. After the data were gathered, they were outlined and organized according to the respective areas mentioned above. Then the data were carefully analyzed and interpreted. To the extent that the writings emphasized particular points of view, revealed weaknesses in techniques, or otherwise pointed up definite conclusions, such information was reported.

The major findings were: No less than 15 authorities emphasized the value of cooperative participation in formulating written policies. No less than 15 authorities regarded policy-making as the primary function of the school board. No less than 19 authorities stated that official minutes of the board contain many statements of policy. No less than 28 authorities expressed the need for periodic evaluation and revision. In most instances, studies and surveys indicated that the percentage of school systems operating under written policies is less than 40 per cent. Over 50 authorities either made studies pertaining to personnel policies or reported professional opinions.

The major conclusions were: Local board members, as state officials, are responsible for developing policies. The superintendent of schools, with the aid of the school staff, should recommend proposed policies to the school board for final action. School board policies should be comprehensive, broad and general, flexible, administrable, understandable, and supported by procedure. The essential steps in developing written school board policies include: determining local needs, reviewing official minutes, studying other policy manuals, studying specific policy areas, and submitting the proposed policy manual to the board. Community participation in policy-making enhances the citizens' confidence, support, and understanding of the school program. There has been a definite trend in recent years to cooperatively develop policy manuals outlining the services and policies affecting specific groups, individuals, and policy areas. There has been a trend in recent years to distinguish between policies and rules and regulations. Policy statements should be logically organized, put in writing, and distributed to all interested persons. Policy manuals should be developed for each particular school system and should be based on the needs of youth, citizens, and all those affected. There has been a trend in recent years to carefully and periodically evaluate, review, reexamine, and cooperatively revise policies. There is evidence to substantiate the fact that non-instructional personnel policies are limited or non-existent.

The major recommendations are: School policies should be put in writing and should be distributed to all interested persons. More emphasis should be placed on periodic policy review and policy evaluation. More attention should be exerted in professional meetings and workshops at the local, state, and national level to further better school board-superintendent relationships. Colleges and universities which are responsible for preparing men and women for the superintendency should emphasize more clearly the need for and the methods of developing written policies. The codification of state laws and legal decisions pertaining to public education would assist local school

officials in developing sound policies. The development of a score card to rate policy manuals would be advantageous to developing more effective manuals.

Microfilm \$3.90; Xerox \$13.20. 301 pages.

STATUS AND FUNCTIONS OF ASSISTANT SUPERINTENDENTS OF SCHOOLS IN SELECTED CITIES

(L. C. Card No. Mic 59-68)

Clyde N. Carter, Ed.D. Indiana University, 1958

Chairman: Maurice E. Stapley

The study proposed to define the status and functions of assistant superintendents of schools in cities of the United States with a population range of between 100,000 and 250,000 inhabitants by determining the responsibilities and duties which are prescribed by their superintendents and boards of education; the major functions to which they devote 10 per cent or more of their time; the organizational relationship between them and other personnel; and their training, experience, salaries, and ages.

The historical background of the position of assistant superintendent and pertinent articles in periodicals, research manuscripts, and books were reviewed. Data were obtained from questionnaires completed by superintendents and assistant superintendents of schools in cities of between 100,000 and 250,000 people. The responses were classified, and statistical treatment was limited to frequency tabulations and computation of percentages.

The major findings and conclusions of the study were: over one-half of the cities which participated in the study employ assistant superintendents or officials with synonymous titles; there was little similarity among specific titles of assistant superintendents; more than one-third of the assistant superintendencies in cities reported in this study have been created from 1948 through 1957; the majority of boards of education have written guides--either policy manuals and/or rules and regulations; the functions of assistant superintendents, whether prescribed in oral directives of the superintendents or in written assignments of either the superintendents or boards of education, vary even when positions are grouped according to similar titles; there is some similarity among functions to which assistant superintendents with like titles devote 10 per cent or more of their time; most assistant superintendents are over fifty years of age, have over six years of training, have had over 20 years of experience prior to assuming their present positions, have written contracts for 12 months, receive one year appointments, have tenure either as administrators or teachers, and have majored in administration. Over one-third hold earned doctoral degrees. Graduate courses considered by assistant superintendents as the most beneficial in preparing for their present positions are: public school administration, supervision of instruction, guidance and psychology, curriculum and methods, history and philosophy of education, educational testing and measurement, finance, and school-community relations; additional graduate courses from which over 20 per cent of the assistant superintendents feel they would

benefit in their present positions are: buildings and facilities, budgeting, law, accounting, finance, statistical methods, and research methodology. There is little similarity among types of positions assistant superintendents held immediately prior to their present positions. Annual salaries range from less than \$7,000 to \$14,750, with a median salary of \$11,360.11; most assistant superintendents receive travel and expense allowances.

The major recommendations were: job analyses should be made by individual schools of the various titled classifications of assistant superintendents in their system; institutions who train those aspiring to assistant superintendencies should encourage trainees to pursue those courses considered beneficial by assistant superintendents; opportunities should be provided by superintendents and school boards for assistant superintendents who feel they would benefit from additional courses to obtain needed training; attempts should be made to increase the salaries of assistant superintendents who are far below the median salaries of those who perform similar functions in other cities; as the related literature indicates that the number of persons who report directly to any one person should be restricted to nine or less, steps should be taken to reduce the number in those schools who have more than that number reporting to any one assistant superintendent; and the school boards who do not have written policies and rules and regulations should consider preparing guides.

Microfilm \$3.25; Xerox \$11.00. 249 pages.

CERTAIN CRITICAL REQUIREMENTS FOR THE SECONDARY SCHOOL PRINCIPALSHIP AS PERCEIVED BY SECONDARY SCHOOL TEACHERS IN THE METROPOLITAN NEW YORK AREA

(L. C. Card No. Mic 58-5660)

Sanford Clarke, Ed.D. New York University, 1958

Chairman: Professor William Van Til

The investigation was concerned with collecting and analyzing the specific behaviors of the principal which were perceived by secondary school teachers as being effective or ineffective in accomplishing the purpose of the principalship. By classifying the behaviors into the critical requirements for the job, a means was provided for describing not only the specific requirements which were perceived as being truly crucial to the job, but also the quality of the principal's performance in meeting the requirements.

The collection and interpretation of the data were based upon the principles and practices associated with the critical incident technique developed by John C. Flanagan during World War II. The technique has been successfully applied to job analyses in such diverse occupations as airline pilots, dentists, foremen and educators.

An instrument was developed for recording effective and ineffective critical incidents, along with control data revealing aspects of the personal and professional background of the respondents and subjects, and descriptions of the school in which the incident occurred.

The respondents were 412 secondary school teachers

in New York City and suburbs. Group interviews were undertaken in teacher education institutions and in privately organized in-service courses. The respondents contributed 477 critical incidents which contained 702 critical behaviors. The behaviors were classified inductively into 101 critical requirements which were categorized into five major areas and nine sub-areas of activity.

Among the findings arrived at through an analysis of the critical requirements and the control data were the following:

1. Teachers perceive the over-all behaviors of the principal as being significantly effective.

2. Teachers regard the areas of the principal's activity, arranged in descending order according to the number of behaviors reported, as consisting of relationships with 1) teachers, 2) students, 3) parents, 4) superiors, and 5) the community.

3. The most important area of the principal's activity is his relationships with teachers, and his behavior in teacher-principal relationships is of major importance to

the successful accomplishment of his job.

4. The most important abilities which the principal requires for successful relations with teachers appear to be 1) the ability to give praise and recognition unstintingly when deserved, 2) the ability to feel genuinely appreciative of the value of teachers' contributions to the educational program of the school, and 3) the ability and desire to help teachers become more effective.

5. The principal is found to be significantly effective in his supervisory relationships and particularly in providing teachers with commendation when deserved, and assisting them in employing effective methods, materials and techniques.

6. The principal is regarded as significantly ineffective in upholding the dignity of teachers before others.

7. The most frequently reported critical requirement concerned the principal's efforts to maintain student discipline.

8. Teachers are greatly concerned about the problem of student discipline and expect firm action from the principal in maintaining proper standards of behavior along with strong support of teachers' disciplinary efforts.

9. Principals in New York City schools are perceived by teachers as being significantly more effective than their suburban counterparts in their supervisory functions.

10. No significant relationships were found between the perception of the quality of the principal's behavior and any of the personal or professional factors in the background of the teachers or principals.

The findings should be made available to principals, superintendents, school boards, and teacher education institutions as a guide in establishing the requirements for the principalship, as a means of evaluating job performance, and as an aid in determining the nature and direction of programs preparing for the principalship.

Microfilm \$2.45; Xerox \$8.60. 186 pages.

A STUDY OF THE CHANGES IN STUDENT AND PARENT ATTITUDES TOWARD SCHOOL AS EFFECTED BY PARTICIPATION OF STUDENTS IN DETERMINING A LIMITED NUMBER OF SCHOOL PRACTICES

(L. C. Card No. Mic 59-625)

Robert Byron Cody, Ed.D. Syracuse University, 1958

Supervisor: Paul M. Halverson

The Problem

The primary purpose of this study was to examine student satisfaction with school as it may have been effected by participation in a limited amount of decision-making by students in grades nine through twelve in a central school in Sidney, New York. The decision-making shared by students in this study involved a limited number of school practices which directly affected them. A secondary purpose was to examine any possible relationship between students' and parents' satisfaction toward school and the degree to which parental satisfaction may have been affected by the students' participation in decision-making.

At the beginning of the 1955-56 school year, a status measure of the attitudes of 329 students and 55 parents was obtained by questionnaires and interviews using an original instrument designed to measure general satisfaction with school. During the school year, students participated in a limited amount of decision-making. At the end of the same school year, another measure of student and parent attitude was obtained. The process followed in this study sought evidence for the evaluation of the following hypotheses:

- 1. The degree of student satisfaction toward school will be increased by giving students a voice in determining certain selected school practices which affect them.
- 2. The degree of satisfaction toward school expressed by students and parents will be positively correlated before and after the experimental conditions are introduced.
- 3. Parents of students in the experimental group will show an increase in degree of satisfaction toward school corresponding to, but less than, that of their children.

The Instrument

The instrument used in this study consisted of sixty-eight statements about various facets of a school program. The statements comprised eleven areas: General Satisfaction, Public Relations, Reporting, Guidance, Personal Adjustment, Curriculum, Extra-curricular Activities, Teacher-Student Relations, School Services and School Plant.

Findings and Conclusions

Satisfaction scores of students in the experimental school showed a statistically significant decrease at the end of the year. The satisfaction scores of the control groups of students and of the parents showed no change over the same period of time.

The satisfaction scores of students and their parents showed a statistically significant correlation when scores of separate test items were correlated. However, there was no correlation between parent and student scores when total individual scores were correlated.

An analysis of the findings suggested that the experimental conditions used to involve students in decision-making were ineffectual because of the large number of students in the experimental group. There was some evidence to indicate that participation in decision-making results in satisfaction with the specific decision without casting a halo effect upon general satisfaction. Also, there was some evidence to support the conclusion that satisfaction in this instance decreased because of an over-crowded school plant. Microfilm \$2.00; Xerox \$7.00. 147 pages.

AN EVALUATION OF TRADE AND INDUSTRIAL EDUCATION IN THE PUBLICLY SUPPORTED SCHOOLS OF UTAH

(L. C. Card No. Mic 58-7946)

Wendell Luke Esplin, Ed.D. University of Utah, 1958

Chairman: Dasil A. Smith

Utah is evolving from an agrarian economy to an industrial economy requiring a higher level of training to meet

the demands of increasing mechanization and automation. It is important to the people of Utah and to present and potential industry to know how well the trade and industrial education programs are meeting their objectives. An extensive study of trade and industrial education has not been made since 1939.

Problem. This study had three problems to solve:
(1) To survey, analyze, and evaluate the programs of trade and industrial education in publicly supported schools of Utah, (2) to present a systematic appraisal of the effectiveness and extent of the training provided, and (3) to propose improvements in the trade and industrial education programs in light of the evaluation.

Method. The evaluation of trade and industrial education in the publicly supported schools of Utah was made by a committee using a standardized evaluation instrument. The evaluation committee was composed of professional educators, students, and representatives from industry and labor. The committee was divided into sub-committees to survey, analyze, and evaluate the various programs in the five schools included in this study.

Summary. Table I presents a summary of the analysis of the data on administration and supervision, training programs, evening school programs, and instructors.

Microfilm \$6.95; Xerox \$23.80. 545 pages.

TABLE I EVALUATION SUMMARY

Evaluation Areas												SCH	OOLS											
	A				В				С				מ				E				Totals			
	Total	No.	Ave.	Total Pos	Total	No.	Ąvę.	Total Pos.	Total	No.	Ave.	Total Pos.		No.	Ave.	Total Pos.	Total	No.	Ave.	Total Pos.		No.	Ave.	Tota
Adminis- tration and Supervision ^a	81 ^e	28	2.9	140	105	28	3.8	140	87	28	3. 1	140	103	28	3.7	140	84	28	3.0	140	460	140	3. 3	700
Training Program ^b	260	115	2. 3	575	952	240	4, 0	1200	1954	567	3.4	2835	1546	399	3.9	1995	153	54	2.8	270	4865	1375	3.5	6875
Evening School ^C	85	20	4.3	100	123	40	3, 1	200	152	44	3.5	220	74	20	3.7	100	N	N	N	N	434	124	3.5	620
Instructors d	309	95	3. 3	475	753	209	3.6	1045	1548	432	3.6	2160	1003	285	3.5	1425	249	76	3.3	380	3862	1097	3.5	548
Totals	735	258	2.8	1290	1933	517	3.7	2585	8741	1071	3. 5	5355	2726	732	3.7	3660	486	158	3.0	790	9621	2736	3, 5	13680

a Includes summaries of vocational supervisory staff, determining needs for training programs, public relations, advisory committees, financial support, and continuing improvement of the training programs.

b Includes summaries of course objectives, course content, physical provisions, instructional physical facilities, instructional methods, classroom management, and similarity between the training program and the methods and practices in industry.

c Includes summaries of technical or related courses and adult courses.

d Includes summaries of general and professional preparation and attitude, interest and activity in community and school affairs, occupational alertness and activity, and instructor-student relations.

e Key - The evaluation summaries were indicated by a number from 0 to 5 and should be read as follows: 0 indicates missing, 1 indicates poor, 2 indicates fair, 3 indicates good, 4 indicates very good, and 5 indicates excellent.

THE STATUS AND FUNCTION OF THE PUBLIC ELEMENTARY SCHOOL SUPERVISOR IN THE THIRD AND FOURTH CLASS DISTRICTS OF THE PENNSYLVANIA COUNTIES OF CHESTER, DELAWARE AND MONTGOMERY

(L. C. Card No. Mic 59-312)

Norman Dean Evans, Ed.D. Temple University, 1958

The purpose of this study was to investigate the position of elementary school supervisor in the third and fourth class school districts of Chester, Delaware and Montgomery Counties in Pennsylvania; and to attempt to define the status and function of the supervisor and the importance of the position.

The need for this study was revealed through a survey of the literature and studies in elementary school supervision. There was a need to define the position as well as the relationships of the supervisor with other staff members

The data was collected through questionnaires sent to the thirty-four supervisors in the study; and through depth interviews with the supervisors, twenty-eight superintendents and supervising principals, twenty-four elementary principals, and twenty-nine classroom teachers from the twenty-nine school districts involved in the study.

Major findings were as follows.

- 1. The median sized district in the study included 41 to 60 elementary classroom teachers, 1,001 to 1,500 elementary pupils, and three elementary schools. It was felt that the position of elementary school supervisor was necessary for the most effective coordination of the total elementary program in these districts and probably in others of similar organization and size.
- 2. All elementary school supervisors were part of a line organization in the area of supervision, involving the chief school official and the elementary principals. The principals were usually directly responsible to the supervisor in the areas of curriculum and improvement of instruction.
- 3. All supervisors had baccalaureate degrees and most held Masters degrees.
- 4. Thirty-three supervisors had taught in the elementary grades, and eleven of the thirty-four had served as full-time elementary principals.
- 5. Curriculum coordination and development and the improvement of classroom instruction were identified by most of the interviewees as the major areas of function for the elementary supervisor.
- 6. The supervision of instruction was considered to be a cooperative function involving the elementary school supervisor, the chief school official, the elementary principals and the elementary teachers, with the leadership provided by the supervisor.

7. The key role of the elementary principal as the responsible head of an elementary school was recognized. The principals had primary authority for supervision and administration in their respective buildings.

- 8. The elementary school supervisor was recognized as the individual who should be primarily responsible for the coordination of the total educational program in the elementary schools of a district.
- 9. The major problem areas were those of inadequate administrative and supervisory staff and lack of time to fulfill the functions of elementary supervision.

The main conclusions of the study were as follows.

- 1. Since coordination is important in the elementary schools of a district, since principals necessarily have a limited view of one school and community usually, and since chief school officials do not have time to adequately supervise, the position of elementary school supervisor is necessary.
- 2. The elementary supervisor is in a line and staff organization but the line relationship is not overemphasized. The supervisor is considered the final authority in the areas of curriculum and improvement of instruction, but works cooperatively with the principals and teaching staff. The supervisor does not participate in administration in districts with full-time principals. His main function is coordination of the total program.
- 3. In districts with full-time, non-teaching elementary principals, the principal is the educational leader of his school, exercising supervisory and administrative responsibility with his staff.
- 4. There is apparently little concerted effort to coordinate the total program of many districts from kindergarten through twelfth grade.
- 5. Considering the broad functions of the position, many elementary school supervisors seem to be inadequately prepared, in terms of experience and training.
- 6. There is a definite need for more full-time, non-teaching elementary principals in addition to the elementary supervisor.

Microfilm \$3.75; Xerox \$12.60. 290 pages.

TAX-EXEMPTION OF PRIVATE PROPERTY AND THE PUBLIC SCHOOLS OF MONTGOMERY COUNTY, PENNSYLVANIA, FROM 1944 THROUGH 1953

(L. C. Card No. Mic 59-313)

Franklin P. Gill, Ed.D. Temple University, 1958

The purpose of this study have been to reveal how much income has been lost to the school districts of Montgomery County, Pennsylvania, through the exemption of privately owned real property from taxation and to show to whom these exemptions have been granted. The study is limited to the decade 1944 through 1953. It uses the assessed valuations, tax-exempt assessed valuations, pupil populations, and tax rates of the school districts to reveal the loss sustained by each through tax-exemption. Tables are used to present these data and to show the ownership of tax-exempt real estate by category and by actual owner. The methods used were basically historical and sta-

tistical.

The following major conclusions were drawn:

1. The assess books of Montgomery County were an unsatisfactory source of data because of omissions, errors, and inadequacies. 2. The tax rate and ratio of assessment to market value were unsatisfactory data for interpreting the tax burden on real estate of a school districts. Only when stated as an index number, with county, area, or state averages as a base and with the inclusion of allowance for tax-exempt real estate, can a true picture be gained.

3. School districts vary tremendously in their ability to support public education through real estate taxation, and

this ability is affected seriously in some districts by tax-exemption. 4. In the decade 1944-1953, tax-exempt real estate was increasing much less rapidly than taxable real estate. 5. Certain categories of exemption cause inequities of tax burden by being area-selective. 6. Because people do not confine themselves to the use of tax-exempt institutions which lie in the school district or county in which they live, any study of tax-exemption which follows governmental boundaries is indicative of a situation, but does not define it.

The following major recommendations were made:

1. Legislation should be enacted requiring third class counties to adapt scientific assessment practices such as are now required of counties of the fourth through eighth classes. 2. Real estate should be placed on the tax-exempt list only by a state agency upon application to it by the party seeking the exemption. This state agency should be empowered to hold hearings upon such applications and appeal from its decisions should be permitted only to the Superior Court of Pennsylvania. 3. Notarized form reports should be required for each parcel of real estate on the exempt list each year and the list checked against these reports. 4. A list of each county's tax-exempt real estate by municipality, including the name and address of the owner, the date exempted from taxation, and the reason for the exemption, should be made a part of the public record of the county. This list should be required to be printed annually in the local press within the county. 5. In computing the reimbursement fraction, the market value of taxable real estate of each school district should be reduced by the market value of its tax-exempt real estate when determining the valuation per teaching unit. This would correct the inequities which now exist in reimbursement due to the concentration of tax-exempt realty in some school districts. 6. The General Assembly should study the problem of taxexemption of real property very carefully. These exemptions amount to subsidies for activities which the state considers desirable or necessary. These exemptions can be extended in such manner that they are granted to particular groups out of proportion to the services that such groups give to the general population.

Microfilm \$4.35; Xerox \$14.60. 338 pages.

RESPONSIBILITIES OF THE EDUCATIONAL
SECRETARY FOR ACTIVITIES PERTAINING TO THE
PROFESSIONAL EDUCATIONAL FUNCTIONS OF THE
SCHOOL PRINCIPAL'S OFFICE
(VOLUMES I AND II)

(L. C. Card No. Mic 59-74)

Dorothy C. Grovom, Ed.D. Indiana University, 1958

Chairman: Elvin S. Eyster

The Problem

The problem was a study of the extent of responsibility of the school principal's secretary for the activities concerned with the professional educational functions of a school principal's office. The study dealt with (1) the

responsibilities of the school principal for the activities performed in discharging the professional educational functions of the school principal's office and (2) the nature of the activities, and the extent to which the secretary to the school principal is responsible for these activities.

Procedure

Data pertaining to the professional educational functions of the school principal's office were secured from literature and from interviews with several principals and principals' secretaries. A check list, classified into 7 areas and 30 categories of 175 professional educational activities, was constructed and mailed to head secretaries to principals in the public schools of Indiana. The emphasis in the study was on the level of participation (clerical or routine, semiprofessional, and professional) in the categories and the areas of activities. An analysis of the data was made for all 313 secretaries co-operating in the study, and for six subgroups, the result of taking three factors into account: basis of employment--full-time vs. parttime; years of experience--over one year of experience vs. one year and less of experience; and type of school-elementary vs. high school plus combinations of high school and junior high school.

Findings

The amount of participation by all 313 secretaries was rather high. Participation by all 313 secretaries, as well as by the groups of secretaries, was predominantly on the clerical or routine level and rather low on the semi-professional and professional levels combined. The area of Records and Written Communications had the most participation for all 313 secretaries and all of the subgroups of secretaries. Personnel Administration had the least participation; and Instructional Program, next to the least. In Public Relations; Enrollment of Students, Their Progress, and Their Behavior; and Buildings and Grounds, Books, Supplies, and Equipment, participation for all 313 secretaries was relatively high; and in Special School Services and Events, rather low. The rank of the areas was the same for all 313 secretaries and for three of the subgroups (full-time, over one year of experience, and one

On the semiprofessional and professional levels combined, there was more participation for the full-time group than for the part-time group, more for the over one year group than for the one year and less group, and more for the high school plus high school and junior high school group than for the elementary group. On the clerical or routine level, the opposite was true, that is, the groups that had more participation on the semiprofessional and professional levels combined had less participation on the clerical or routine level.

Conclusion

There is disparity between the principal and his secretary as to level of performance of professional educational activities in the principal's office. In most cases that disparity is rather wide in that the secretary assists the principal on the clerical or routine level primarily. In some cases, however, the work situation and the qualifications of the secretary are such that the disparity narrows; in

those cases the secretary's performance is at the semiprofessional or professional level. Certification of the secretary who performs the activities at the professional level particularly should be given careful consideration. Microfilm \$7.70; Xerox \$26.20. 605 pages.

PRINCIPLES AND PRACTICES FOR CO-OPERATIVE COMMUNITY RELATIONS IN REGIONAL HIGH SCHOOL DISTRICT FORMATION

(L. C. Card No. Mic 58-5648)

Peter Leland Henderson, Ed.D. New York University, 1958

Chairman: Professor Herbert B. Bruner

Purpose

This study sought to determine the best principles and practices usable in attaining harmonious and co-operative home-school-community relations within communities forming a regional high school district, particularly in New Jersey.

The Need - Problem and Importance

The need for tested data appeared increasingly evident following World War II as school expansion planning struggled to keep pace with soaring school enrollments. In those years as today, many small districts which had long enjoyed the advantages of the larger neighboring district's high school, suddenly found themselves without such facilities. The neighboring district, which had previously welcomed the smaller district's secondary school pupils on a tuition basis, now, owing to increased enrollments, was hard-pressed to meet its own needs, much less provide for others. Especially pinched in the squeezing that resulted were the small school districts which could not by themselves provide high schools needed for their youth.

The Problem

The cost of secondary education, prohibitive for the small district to undertake alone, became a factor in moving districts toward union or regional high school formation. Two or more communities could combine under a regional district and provide their own high school facilities but bringing two or more communities of people together for such unionization, or regionalization, presented a major problem in inter-group relations.

It is in the early stages of regional district formation that lay committees and school boards in New Jersey often meet with failures in their efforts to secure inter and intracommunity co-operation. Such failures result in costly delays which needlessly postpone essential school construction.

The importance of community and intra-community harmony, agreement and co-operation is all too often lightly treated and underestimated. Yet most frequently these are the keys which open the door to adequate schools. Many regional district study groups learn too late to respect the importance of community co-operation techniques. Some learn only after the smoke of a referendum has risen, fallen, and left their cause in shambles.

Methods, Procedures and Data

The normative-survey, interview and jury methods of procedure were followed in the collection and treatment of data. In order to simplify the identification of objectives and goals in each step of district formation policies, the whole period -- from beginning to acceptance of district formation -- was sub-divided into areas of Origin, Study, Decision and Acceptance. This is referred to as the "OSDA" technique or pattern in the investigation.

A questionnaire was distributed to determine what principles and practices for attaining co-operative community relations in district formation were actually being used in the field. The tabulated results of this questionnaire, which had reached county superintendents, district administrators, board members and others who had regional district formation experience, provided data for the evaluation by jury. The jury of 16 specialists evaluated 248 principles and practices pertinent to co-operative community relations. Following tabulation of the jurors' scores, each principle and practice was rated and ranked according to its essentialness on the basis of the jury's evaluations.

Conclusions -- Recommendations

The recommendations, which are found along with some generalizations and implications in the conclusion, suggest that:

- 1. More extensive field use be made of 146 of the 248 principles and practices examined.
- 2. Before use, 33 principles and practices be examined in light of local needs.
- 3. Caution be used before employment is made of 69 of the 248 principles and practices.
- 4. Use be made in district formation of the "OSDA" technique or pattern (break-down of whole area into subareas of Origin, Study, Decision and Acceptance) in order that goals and objectives may be clearly identified and examined, and evaluations made progressively in each step toward acceptance.

Microfilm \$2.75; Xerox \$9.40. 210 pages.

A STUDY OF FACULTY MORALE IN ONE JUNIOR HIGH SCHOOL IN NEW YORK CITY

(L. C. Card No. Mic 58-5655)

Roberta Bowles Hodges, Ed.D. New York University, 1958

Chairman: Professor Frederick L. Redefer

The purpose of this research has been to investigate several factors which affect teacher morale status in one junior high school in New York City. In order to determine the moral status of 55 teachers, data from responses to 108 items in a teacher opinionnaire were compiled and analyzed. The results of the teachers' responses to 108 items revealed that morale was "high" in the following areas: Administration and Administrative Policy; Teacher, Supervisor Relations; and Curriculum and Practices. Morale was "low" in three areas of the instrument in that less than 60 per cent of the teachers gave positive or

favorable responses to 31 items in the areas of Teachers and Pupils; Board of Education and Central Administration, and Personnel Policy and Practices.

Twenty three or 41 per cent of the teachers showed strengths of response ranging from 16 per cent to 41 per cent of the 108 opinionnaire items. Strength of response is important in that it shows those items about which teachers feel strongly. Responses also showed that teachers with "high" morale tend to feel more strongly about certain items which affect their morale.

A teachers' personal liking for pupils ratings scale was administered in order to help determine any relationship between teachers' morale status and teachers' personal liking for pupils. A significant relationship was found between these two factors in that a coefficient, r, $\neq 0.59$ was obtained. Apparently, teachers in the upper quartiles of morale status tend to like pupils to a higher degree than teachers in the lower quartiles of morale status.

Five hundred ninety-eight pupils rated 21 teachers on 10 items in a pupil opinionnaire. Analyses of data revealed that a summation of the 10 items, or the pupil-teacher relationship, had very little relationship to the morale status of teachers. A coefficient of correlation, r, $\neq 0.17$ existed between teachers' morale status and the pupil-teacher relationship. However, two factors in the pupil-teacher relationship were related to teachers' morale status: (1) students' sharing decisions, r, $\neq 0.46$ and (2) pupils' belief of teachers' liking for pupils, r, $\neq 0.87$. A highly significant relationship was found to exist between pupils' personal liking for teachers and the pupil-teacher relationship. A coefficient of correlation, r, $\neq 0.91$ was obtained.

In order to determine whether any relationship existed between the morale status of 55 teachers and 5 administrative ratings on 7 qualities which help make a good teacher, data were compiled and analyzed. A definite relationship was found between teachers' morale status and administrative ratings on 7 qualities which help make a good teacher in that a coefficient of correlation r, \(\nu \).49 was obtained. Question \(\# 7 \) of the administrative rating scale asked, "What is the morale status of this teacher?" Linear correlation revealed that a relationship existed between teachers' morale status and administrative morale status ratings. A coefficient of correlation, r, \(\nu \)0.31 was obtained for these two factors.

When compared with the average item scores of 25 New York City public schools, Junior High School W-O had the lowest score on 1 item and the highest scores on 9 items in the teacher opinionnaire. Junior High School W-O had higher mean difference scores when compared with the average morale tendency scores of 26 New York City public schools; however it ranked first when compared with the average morale tendency scores of 12 New York City junior and senior high schools.

Microfilm \$2.90; Xerox \$10.00. 222 pages.

DEVELOPMENT OF A MANUAL FOR PHYSICAL EDUCATION AND RELATED RECREATIONAL FACILITIES FOR THE STATE OF MINNESOTA. (PARTS I AND II)

(L. C. Card No. Mic 58-5656)

Lloyd E. Hollingsworth, Ed.D. New York University, 1958

Chairman: Dr. Milton A. Gabrielsen

The purpose of this study was to establish standards for the development of physical education and related recreation facilities in the public schools of the State of Minnesota, and then to use these standards in the preparation of a manual on the planning and design of facilities. The manual is directed toward school administrators, physical education teacher, athletic coaches, recreation leaders, and school building planners.

The 1930's were highlighted with several movements which were important to the subsequent development of physical education and recreation facilities. The momentous force that produced these movements was the great depression of this decade. This great catastropne brought forth the creation of certain federal programs which profoundly affected the development of facilities. The state statutes and the State Department of Education regulations were influenced by these forces.

World War II, along with the related factors of farm mechanization, school transportation, school consolidation, urbanization, and the post-war population bulge and distribution have also influenced facilities.

National facilities guides are available but none was found which was comprehensive enough to fit local school types at the various enrollment levels. School administrators and state department of education officials encouraged the development of a state facilities manual.

The procedures used in this study included library research, interviews, visitations, conferences, and a review of the current literature.

Library research was used to investigate the influencing factors and legal requirements which background the development of facilities. Interviews were used to trace the trends and innovations pertinent to the state.

Visitations and conferences were used to ascertain the present status of facilities and the relationship of program to facilities.

The visitations were made to a selective sample of thirty school districts where data were collected on four check lists. An additional thirteen (total of forty-three) districts were similarly visited from which supplementary data were drawn. The basis for selecting the schools in the sample was as follows: five enrollment classifications, three levels of assessed tax valuation, two geographic zones, three social structures, and three types of school plants including five types of buildings.

A review of the current literature was used to develop standards which meet local needs. In developing these standards, consideration was given to the local state factors revealed in the background study and the current status study.

The following conclusions resulted from the research:

1. The Great Depression of the 1930's and the accompanying federal programs were influential in producing facilities, developing an awareness to facility

needs, evolving community recreation programs, instigating the concept of joint school-community use of facilities, and inspiring the enactment of recreation legislation.

- 2. The 1940's and World War II, including the constant expansion of school transportation, school consolidation, urbanization, farm mechanization, and school enrollment have increased and changed facility needs.
- 3. The school districts of Minnesota make extensive use of community-owned facilities in physical education, and in turn community recreation programs use school facilities. This joint use of facilities is accomplished with a minimum of conflict.
- 4. The enrollment level, tax level, and type of school plant strongly influence the amount and type of facilities provided, while the socio-economic structure and geographic location are of lesser importance.
- 5. The availability of facilities is a determining factor for the number and type of activities found in the program.
- 6. Standards which are in harmony with the current literature and which meet state needs may remain in the realm of feasible accomplishment.

The manual which was developed for the State of Minnesota encompassed the following areas:

- 1. Facility planning
- 2. Historical background
- 3. Indoor facilities
- 4. Outdoor facilities
- 5. Service facilities
- 6. Administrative facilities.

Microfilm \$5.30; Xerox \$18.80. 414 pages.

STATE LIMITATIONS ON LOCAL PUBLIC SCHOOL EXPENDITURES IN THE UNITED STATES

(L. C. Card No. Mic 58-7419)

Harry E. Huls, Ph.D. University of Minnesota, 1958

Statement of the Problem.

What items of expenditure for schools should be limited and which should not? Many types of school expenditures limited by law are not adequately treated in the literature and therefore the means of evaluating these limitations is lacking. Thus, the purpose of this thesis is to determine which limitations are desirable and which are not and to develop principles to guide the amending and forming of laws limiting these expenditures.

Method of Procedure.

For the purpose of developing principles, all the literature on the subject of limitations was reviewed. The following points of view were determined as representing the thinking of authors:

- 1. General expenditure limitations were considered to be a function of the local government.
- 2. Tax limitations were opposed.
- 3. Debt limitations were considered desirable.

- 4. Interest rate limitations were opposed.
- 5. Budgetary laws were considered desirable.
- 6. Statutory limitations were favored over constitutional limitations.

Next, the laws of the forty-eight states were assembled for the purpose of determining all the items limited by law.

The principles deduced from the literature and from the state laws together with the items of limitation found, were submitted to two panels of experts which were (1) a panel of professors of educational administration, and (2) the state departments of education in the forty-eight states. These panels rated each principle and item under the categories "agree," "agree with reservations," and "disagree."

Findings.

The following principles were accepted as a result of the research:

- 1. Total debt should be limited, rather than warrants, bonds, etc., being limited separately.
- 2. The only limit on total expenditures should be a budget voted upon by the people or a representative body of the people elected for that purpose, with dedicated funds being allocated as dedicated.
- Transfers within funds of the budget should only be limited for transfers out of dedicated or capital moneys.
- 4. Transfers between funds of the budget should be limited by state law for transfers out of dedicated or capital funds while other transfers should be limited by board action only.
- 5. Interest should not be limited as to rate or amount, but should be arrived at through bids.
- 6. Purchases above a set limit should be obtained by bids.
- 7. Any limitations on expenditures or borrowing should be statutory rather than constitutional.
- 8. No exceptions should be made to the laws limiting expenditures or bonds to suit certain districts, but if exceptions are necessary, the entire law should be revised to fit all districts of the state.

The items of limitation on expenditures were accepted as follows:

- 1. Salaries and expenses should be limited by law for:
 - a. District school board members.
 - b. County school board members.
- 2. Salaries and expenses should not be limited by law for:
 - a. Assistant county superintendent.
 - b. County superintendent or supervisor.
 - c. County truant officer.
- 3. The following should be limited by law:
 - a. Long term debt (bonds, etc.).
 - b. Short term debt (warrants, etc.).
 - c. Total debt.
- 4. The following should not be limited by law:
 - a. Tax levies.
 - b. Interest rates.

- c. Purchases in general.
- d. Election costs.
- e. Publishing.
- f. Expenditures for real estate.
- g. Membership dues to organizations.
- h. Premiums on surety bonds.
- i. Total expenditures.
- j. Mileage.
- k. Library board salaries.
- 5. Tuition should be limited to actual cost of education per pupil.
- 6. The following items could not be analyzed:
 - a. Maintenance of student away from home.
 - b. School paid pensions.
 - c. Salaries and expenses of officers of school building corporations.

Recommendations.

In general all states should examine their laws in the light of these findings and apply these principles, repealing those laws which should not exist and modifying those which are not in conformity with the principles.

Minnesota, in particular, should repeal all but the four classes of laws which are acceptable in terms of the findings, modify all of the remaining limitations except the tuition laws, and add a budget law in keeping with the principles outlined here.

Microfilm \$3.75; Xerox \$12.80. 292 pages.

A STUDY OF THE HOLDING POWER OF THE ELIZABETHTON COMMUNITY SCHOOLS

(L. C. Card No. Mic 58-7599)

Samuel P. Hyder, Ed.D. The University of Tennessee, 1958

Major Professor: Orin B. Graff

This study was designed to investigate what happened to five hundred and nine Carter County Tennessee pupils over a period of twelve years. All the 1946 first grade pupils starting to Elizabethton High School's fourteen feeder schools were included. The study included a search for the pupils who withdrew from these schools from the time of their entrance in the first grade until the time of their withdrawal, retardation, or their normal graduation in 1958. Attempts were made to find the age the school leaver withdrew; the grade level at the time of leaving; stated reasons for leaving; the facts relative to intelligence and achievement of the school leaver compared with those who remained in school; the attendance record of the school leaver compared with those who remained in school; the socioeconomic and cultural status of the school leavers compared with those who remained in school.

The study, composed of 264 boys and 245 girls divided into three groups, Withdrawals, Stay-ins, and Status-Un-known, was pursued through examination of the school records over the twelve-year period, and by interviews and questionnaires.

Analysis of data in every case had to be based upon data furnished by those students or the records of those

students who could be located. The results then were based upon a number of students which rarely approached 100 per cent, but nevertheless appeared sufficiently representative of the whole to give a valid picture.

The findings concerning the 509 school entrants in 1946 were: 226 graduated from high school; 198 withdrew from school before graduation; 52 were left in school as repeaters; and, 33 entrants in 1946 were not located.

The holding power of the Elizabethton High School community was 54.6 per cent; for Tennessee, 39.8 per cent; for the United States, 48.9 per cent; and for Carter County 37 per cent. A larger per cent of boys withdrew than girls. Half of the girl drop-outs either married before leaving school or soon thereafter. Grades eight and ten were most common for school withdrawal. Drop-outs occured more frequently at age sixteen. Drop-outs came from low-tomiddle income families. The educational status of parents of drop-outs was lower than that of stay-ins. The I.Q.'s of the drop-outs tended to be lower than that of the stayins. More drop-outs lived in broken homes than did the stay-ins. Non-participation in class activities was more frequent in drop-outs than in stay-ins. The educational status of the drop-outs' parents was noticeably lower than that of the stay-in group.

The findings presented in the study had certain implications for all persons who are concerned with the improvement of the educational level of all youth of the Elizabethton school community and Carter County to the extent that the following should be provided; an adequate guidance program; a richer and broader school curriculum; competent school administrators; well-trained and professionally minded teachers; consolidation of small schools into larger units with better programs; and more concise and adequate keeping of school records.

Microfilm \$2.75; Xerox \$9.40. 209 pages.

THE ROLE OF SECRETARIES TO SUPERINTENDENTS IN SELECTED MISSOURI SCHOOLS

(L. C. Card No. Mic 58-7428)

Charles Houston Koelling, Ed.D. University of Missouri, 1958

Supervisor: A. G. Capps

Purpose: To determine the distribution of selected office work between the superintendent and his secretarial staff, and to compare this distribution with that deemed desirable by specialists.

Method of Research: The basic data were obtained by the use of two information blanks; one was sent to secretaries to superintendents and one to a panel of specialists.

Summary:

(1) The typical secretary included in this study was employed in her fourth year in the present position, received an annual salary of \$180.50 a month, and received a two week annual vacation with pay. She worked thirty-six to forty hours a week and was eligible for sick leave benefits. High school was

her highest level of formal training, and she had the benefit of a handbook for use in her work.

- (2) There were seventy of the one hundred activities listed in which secretaries should perform most of the work according to specialists' opinions. However, in practice, the secretaries in 60 per cent or more of the schools performed most of the work in only thirty-six of these seventy activities.
- (3) In practice, the superintendents in 20 per cent or more of the schools performed most of the work in thirty-four of the seventy activities wherein secretaries should have performed most of the work according to specialists' opinions.
- (4) There were only three of the one hundred activities in which the superintendents should perform most of the work according to specialists' opinions.
- (5) In practice, secretaries in a greater per cent of the larger schools performed most of the work in more activities than did secretaries in the smaller schools.

Conclusions:

- (1) In general, the status of the secretary to the superintendent of schools does not conform to the status which the importance of the position would seem to justify.
- (2) There is a wide variation among the schools in the distribution of work between the superintendent and his secretarial staff.
- (3) The superintendents in many schools perform work which should be performed by secretaries.
- (4) The secretarial staff has a valuable role to play in the office of the superintendent of schools.
- (5) In general, the secretarial staffs in the larger schools relieve the superintendent of more details than do secretaries in the smaller schools.
- (6) In general, the services of secretaries to superintendents in Missouri schools have not been utilized to the optimum level which would be in the best interests of the educational system.

Suggestions:

- (1) Immediate attention should be given to the feasibility of establishing a program of pre-service training for educational secretaries in Missouri.
- (2) The State Department of Education should make some provision for inclusion of secretarial services in the classification of schools.
- (3) The Missouri School Boards Association should participate in interpreting the need for adequate secretarial services to the boards of education in the state.
- (4) Every school district which employs a superintendent should employ at least one full time secretary.
- (5) Each superintendent of schools should study the activities in which his office is engaged, and plan for the delegation of the many details.

- (6) Those schools which employ a superintendent's secretary for only nine or ten months should give serious consideration to twelve months employment.
- (7) There should be developed in each superintendents office a handbook based on requirements and procedures applicable to the local school system.
- (8) A brief manual for the distribution of some of the office work was included in the study. Microfilm \$2.45; Xerox \$8.60. 188 pages.
- ALLOCATION OF ADMINISTRATIVE FUNCTIONS:
 A STUDY OF THE ALLOCATION OF ADMINISTRATIVE
 FUNCTIONS BETWEEN THE CHIEF SCHOOL
 ADMINISTRATOR AND THE SECONDARY SCHOOL
 PRINCIPAL IN SELECTED SCHOOLS IN NEW YORK
 STATE AS RELATED TO ADAPTABILITY AND
 AN "IDEAL" ALLOCATION

(L. C. Card No. Mic 59-629)

Harold N. Langlitz, Ed.D. Syracuse University, 1958

Statement of the Problem

- 1. To determine the current allocation of administrative functions between the chief school administrator (CSA) and the secondary school principal (SSP) in selected public schools in New York State, and to relate the current allocation to a qualitative aspect of the school system and its educational program, namely, adaptability.
- 2. To determine the extent of mutual agreement between the CSA and SSP regarding the current allocation of functions.
- 3. To compare the actual allocation of functions between the CSA and SSP with an ideal theoretical allocation based upon the opinions of a jury of professional educators.
- 4. To present for comparison the allocation of functions found among participating schools, the school to be grouped on the basis of adaptability scores.

Hypotheses

- 1. There is no significant relationship between adaptability and degree of mutual agreement as to the allocation of administrative functions between the CSA and the SSP.
- 2. There is no significant erlationship between each school's agreement with the jury's "ideal" allocation of functions and adaptability.
- There is no observable difference in patterns of allocating functions among schools ranked according to adaptability.

Procedures

This study was a normative survey of a stratified random sample employing the techniques of interview and questionnaire. Districts with more than one secondary school unit or without a separate SSP were ineligible. Thirty public school districts, representing proportionately each of the several types of school districts, were selected from a total eligible population of 241 districts.

Two instruments were employed: (1) the revised edition of the <u>Time Scale</u> published by the Associated Public School Systems, and (2) an original Interview Guide.

The <u>Time Scale</u>, measuring adaptability, was mailed to the CSA in each school. The score on the completed instrument was the basis for grouping the schools into seven upper schools, sixteen middle schools, and seven lower schools. Data were analyzed and reported according to this grouping.

The current allocation of functions was obtained from the Interview Guide completed during individual ninety minute interviews of both the CSA and SSP in each school. In addition, the Interview Guide was mailed to each jury member. Items on which at least nine of the thirteen judges agreed were accepted as the ideal allocation of functions.

Findings

Current allocation

The current allocation of functions assigned a minor role to the SSP. Most of the functions were allocated to the CSA. An insignificant number of functions were shared by the two administrators.

<u>Disagreements.</u>--Forty-six percent of all responses represented disagreement between the CSA and SSP concerning the current allocation of functions. There was greater disagreement about items assigned to the SSP than about items assigned to the CSA.

Ideal allocation

The ideal allocation of functions assigned a major role to the SSP, with a considerable number of functions also to be shared by the two administrators.

Some relationships

Upper schools, as compared to middle and lower group schools, were characterized by the following:

- a. fewer disagreements concerning the current allocation of functions.
- b. greater agreement with the jury's ideal allocation.
- c. prevalence of the written form of allocating functions.
- d. longer tenure for both administrators.
- e. more experience of both administrators.

Conclusions

- 1. The role of each administrator should be clearly defined.
- 2. The allocation of functions should be in written form, developed through a cooperative process, aimed toward the establishment of clearly defined lines of responsibility and authority.
- 3. Theory of administration and the results of research should be employed in formulating a local allocation of functions.
- 4. The CSA must delegate administrative responsibility and authority.
- 5. Communications between administrators should be improved.

- 6. Disagreement between administrators concerning the allocation of functions, which represents a possible source of confusion and conflict, should be minimized.
- 7. Achieving a satisfactory allocation of functions tends to be related to longer tenure for administrators.
- 8. The accepted plan for the allocation of functions should be periodically evaluated, and sufficiently flexible to allow for revision when necessary.

Microfilm \$4.50; Xerox \$15.00. 350 pages.

A COMPARATIVE STUDY OF CERTAIN FACTORS OF SELECTED UNION SCHOOL DISTRICTS AND JOINT SCHOOL SYSTEMS IN PENNSYLVANIA PAIRED ON THE BASIS OF ENROLLMENT

(L. C. Card No. Mic 59-36)

William Peter Miller, Ed.D. University of Pittsburgh, 1958

Pennsylvania has essentially two types of reorganized units of administration: those formed by joint operation of two or more districts by a contract; and those formed by the union of two or more districts into a single district with a single school board.

Even though the popular trend is towards the establishment of joint systems, there are many educators and lay people who believe that the union district is preferable.

Are there differences that can be noted in the outcomes produced by the two different types of reorganized administrative units? Specifically, the purpose of this study was to investigate whether the union district produced any advantages over the joint system in such factors as: the extent and status of certain personnel; the extent of library, guidance and special education services; and the extent of the secondary courses of instruction.

The study is confined to the union districts and selected joint systems formed between 1948 and 1954 and which offer a complete program of education on the basis of 6-6 or 6-3-3

The administrative units were paired on the basis of enrollment and arranged in order of enrollment from high to low. The data were taken from the 1955-56 annual reports so that every district would have the benefit of the supplemental State appropriation for being a reorganized unit for at least one year.

Some of the conclusions are as follows:

Based upon the selected administrative units and based upon the factors included in the problem, there was no consistent advantage for either group of administrative units.

From the inspection of the data, it would appear that salaries and formal training of the professional personnel and the extent of services and secondary program of studies vary directly with the size of the administrative unit and not with the type of reorganized district.

There was no evidence that the additional money received from the State for being an union school district, above that which is received by the joint system, was used for the improvement of the factors of education included in this study.

There was no appreciable difference in the average number of pupils per classroom on either the elementary level or the secondary level for the two groups of selected administrative units.

The median salary of the elementary classroom teachers in the union districts was slightly higher than the median salary of the elementary teachers in the joint systems. However, for the secondary teachers, the reverse was true.

The total number of clerks employed by all the administrative units was slightly greater for the joint systems.

The adequacy of the high school library services, as determined by a check list, showed the two groups to be equal with the same median score.

The same number of union districts and joint systems desigated a person to be in charge of the guidance program.

Very little was done by either group of administrative units in special education on the elementary level and nothing was done by either group on the secondary level.

The extent of the secondary curriculum as determined by a count of the different course titles showed the two groups to be equal with the same median score.

It should be understood that these conclusions neither affirm nor negate any qualitative differences in the elements of the problem. It should be further understood that the conclusions do not detract from the apparent advantages of the union district over the joint system; namely, the single school board, the single budget, and permanency of operation.

Microfilm \$2.15; Xerox \$7.60. 163 pages.

THE INITIATION OF SUPERVISORY SERVICES IN OHIO COUNTY SCHOOL DISTRICTS

(L. C. Card No. Mic 59-80)

Russell Addison Milliken, Ed.D. Indiana University, 1958

Chairman: Dr. Ruth G. Strickland

The Problem

The purpose of the study was to determine what factors were pertinent to the initiation of programs of elementary school supervision in Ohio county school districts. Specific problems attacked were related to concerns prompting the decision to initiate a program, selection of supervisory personnel, anticipating supervisory activities, cooperative planning of the supervisory program, and the degree to which the practices followed were desirable as determined by a jury of experts.

Procedures

A preliminary questionnaire was mailed to all of the county superintendents in Ohio to determine which counties had initiated a program of general elementary school supervision during the 1956-57 or 1957-58 school years. A

second questionnaire was mailed to the superintendents of those county school districts identified by the preliminary questionnaire as having initiated a program of general elementary school supervision. In addition to the questionnaire interviews were conducted with 22 of the 48 participating county superintendents.

A jury of experts was selected and mailed an opinionnaire designed to elicit their professional opinions regarding the various facets of the study.

Principal Findings

1. There was general agreement among the jury of experts and the county superintendents regarding the professional qualifications for the position of elementary supervisor, the educational concerns underlying the need for supervision, the activities of the supervisory program, and the sources of candidates for the position of elementary school supervisor.

2. The jury of experts indicated that the superintendents' concern for the county course of study exercised too much influence in reaching the decision to initiate a pro-

gram of supervision.

3. The jury of experts indicated that local school administrators and classroom teachers should have exercised more influence in the various decisions regarding the supervisory program.

Conclusions

1. Elementary school supervisory programs were established in Ohio county school districts for the purpose of providing leadership and assistance in the improvement of educational programs.

2. Ohio county superintendents exercised effective leadership in seeking candidates who possessed the necessary qualifications for the position and a large majority of the supervisors employed satisfied the established qualifications.

3. A wide range of opinions and actual situations were reported by the jury of experts and the county superintendents; however, the extent of agreement between the jury and the superintendents and the actual situations reported by the superintendents was relatively high.

4. There are considerations which would appear to justify the superintendents' disagreements with the jury of experts regarding certain aspects of the initiatory procedures.

5. Although the extent of participation by local district personnel was high in many counties it was not generally as high as that specified by the jury of experts.

Recommendations

1. County school districts should consider the establishment of personnel committees to assist the county superintendent in determining the services to be offered by the county school district.

2. Further research should be conducted to determine the advisability of allotting supervisory units to county boards of education on the basis of services needed by local school districts, rather than the number of teachers employed by local school districts.

Microfilm \$2.60; Xerox \$9.00. 198 pages.

A STUDY OF PERSONNEL FACTORS AFFECTING THE OPINIONS AND ATTITUDES OF REGULAR SUBSTITUTE TEACHERS IN THE NEW YORK CITY SCHOOL SYSTEM

(L. C. Card No. Mic 58-7622)

Norma L. Newmark, Ph.D. New York University, 1958

Chairman: Professor Dan W. Dodson

This study is one aspect of a continuing investigation into the problems of morale of teachers and administrators being conducted at New York University under the leadership of Dr. Frederick L. Redefer. The research was designed to study the effect of personnel policies on the opinions and attitudes of regular substitute teachers.

Basic to the entire study is the assumption that high morale status is necessary to improve an educational program, and that administration needs to be more sensitive to the factors that affect morale status and to evaluate policies and practices in terms of their effect on morale status.

In 1947, to comply with a ruling of the State Education Department, the New York City Board of Education established a teacher category known as "Regular Substitute Teacher." Teachers holding a substitute teacher license enter this classification when they are employed to fill an official vacancy for the semester within the first five days of that semester. These regular substitute teachers perform the same duties as regular teachers, but under a different personnel practices code. There is no tenure, no sick leave, no salary increment beyond the sixth salary step, and although their employment is presumably for the semester or year they may be dismissed without notice if a regular teacher seeks the position or cancels a leave, an appointment is made, or the principal so desires.

Information was gathered from the teachers in the study by six instruments designed to measure morale, attitudes toward the position, fellow teachers, administration of the school, Board of Education, pupils and parents, and all aspects of the teacher's working and living situation. Cooperation was on a voluntary basis, and complete anonymity was assured to all respondents; in fact, only one instrument, a sociometric device, provided for a signature. The schools in the study were selected by the Board of Education, and, except in the case of regular substitute teachers specifically brought into the study, there was no direct contact between the participating schools and the researcher.

The study revealed that morale of regular substitute teachers is lower than that of regular teachers in the same school under certain conditions. Compared with a citywide average of all teachers in the study this lowered morale status for regular substitute teachers is also apparent.

Brought into focus were the grievances, dissatisfactions, and poor relationships which contributed to the lower morale tendency scores of the regular substitute teachers. The most critical points of lowered satisfaction were found to be in three areas: first, the Administration of the School; second, Personnel Policies; and third, The Board of Education. The teachers in the study are in agreement on the less positive aspects of their teaching experience. They do not consider adequate or just personnel policies that deprive them of sick leave, tenure, pension rights. To

varying degrees in each group they feel they are not included in evaluation and determination of school policy, that there is discrimination based on license status in committee assignments, that their grievances do not receive the prompt attention they feel they should have.

License status can definitely be said to add a strain to the relationships between regular teachers and regular substitute teachers, and to continue to have an adverse affect on teacher-principal-regular substitute teacher relationships. A teacher must feel and know he is a teacher, not a regular teacher, or a regular substitute teacher, or a per diem substitute teacher; he must have security in his work and a feeling of unity with the total faculty with whom he works toward shared goals.

Microfilm \$3.60; Xerox \$12.20. 278 pages.

A STUDY OF THE CRITICAL ELEMENTS IN TEACHER EFFECTIVENESS IN INDIANA CITY, TOWN AND CONSOLIDATED SCHOOLS

(L. C. Card No. Mic 59-82)

Samuel Edward Pisaro, Ed.D. Indiana University, 1958

Chairman: M. E. Stapley

<u>Problem:</u> The problem of this study was to examine the critical elements in teacher effectiveness in Indiana city, town, and consolidated schools.

The objectives of this study were: (1) to obtain a sample of critical behavioral characteristics of effective and non-effective teachers; (2) to classify such characteristics into a number of logically coherent types, and to determine the types of characteristics most important in superintendents' and school boards' judgments of teacher effectiveness in extreme cases; and (3) to determine whether any relationship exists between the types of critical characteristics reported to certain demographic variables.

Procedure: Letters were sent to the 190 superintendents of city, town and consolidated school systems in Indiana, requesting them to describe, in terms of behaviors, attitudes and characteristics they considered most critical to their evaluation, up to five unsatisfactory teachers within their recent experience and an equivalent number of superior teachers. Responses were received from 71 superintendents, or 37.4 per cent of the total, providing samples of 196 unsatisfactory teachers and 168 superior teachers, for whom a total of 509 and 831 critical characteristics were reported, respectively.

The critical characteristics reported were placed into the following five types: (I) personal characteristics, (II) professional spirit, (III) teaching techniques and ability to aid pupil growth, (IV) knowledge of subject matter, and (V) community relations.

Conclusions: Statistical analysis showed that the distribution of critical characteristics into these five types differed from the two samples, with a relatively higher proportion of unsatisfactory characteristics under the heading of "Personal Characteristics," and a relatively higher proportion of superior characteristics under the heading of "Teaching Techniques and Ability to Aid Pupil Growth."

Statistical analysis also disclosed that the two samples differed significantly with respect to eight of the 10 background variables considered, but close inspection of the data showed that the conclusion that these variables were significantly related to the superintendents' evaluations was rigorously justified in the case of only four of them. These significant variables were (a) amount of college preparation, (b) amount of training in professional education, (c) amount of previous experience, and (d) amount of experience in the school system. The significance of this last variable was essentially predetermined by the structure of the study.

Analysis of the relationships between the types of critical characteristics reported and the background variables showed significant relationships in the case of four variables for the sample of unsatisfactory teachers and two variables for the sample of superior teachers. The significant variables for unsatisfactory teachers were: (a) amount of college preparation; (b) major subject in college, (c) amount of previous experience, and (d) grade level taught. For superior teachers the significant variables were (a) age when employed, and (b) grade level taught.

It can therefore be concluded that, although teachers rated as unsatisfactory and superior, respectively, by their superintendents differ with respect to many background variables, the data of the present study do not justify considering more than a few of these variables as factors related to superintendents' evaluations. All of the significant variables dealt with the teachers' professional training and experience.

It can also be concluded that certain variables dealing with the teachers' professional training and experience were significantly related to the types of critical characteristics reported, at least in the case of unsatisfactory teachers.

Microfilm \$2.10; Xerox \$7.40. 158 pages.

CHANGES IN THE CHARACTERISTICS OF MASTER'S STUDENTS IN EDUCATIONAL ADMINISTRATION

(L. C. Card No. Mic 58-7602)

Helen Stratton Powers, Ed.D. The University of Tennessee, 1958

Major Professor: Orin B. Graff

The problem in this study was to describe and report the effect of a second experimental program which was conducted in the summer of 1957 by the Department of Educational Administration of the University of Tennessee. The specific purpose of the experiment was two-fold: (1) to acquire additional evidence in relation to the belief that beginning Master's students can change behaviorally in a certain kind of educational setting, and (2) to determine if a cluster of definable differences exists between those who change and those who do not change as a result of the educational experience. The Tennessee Rating Guide, which described the behavior of potential or practicing administrators who function in various capacities in the educational positions they hold, was the instrument by which change was determined. Individuals were subjected to two ratings, a pre-rating prior to their participation in the program and a post-rating about eight months following the completion of the summer term.

The 1957 experiment was the same as the 1956 pilot experiment with certain modifications. The present study, in addition to noting similarities and differences between the group participating in the previous study and the group in the present experimental program, proposed a list of identifiable personality traits which affect behavioral change, and suggested further steps in experimentation.

In the class meetings psychological tests were administered to the group. The tests dealt with attitudes, interests, critical thinking ability, and beliefs. In addition to tests, meetings of the group were developed as a combination of a psychology course and an educational administration course. The psychology portion of the curriculum emphasized the development of personality and interpersonal relations. The education emphasis was an introduction to theory and practice in educational administration. Near the end of the summer classes, some of the tests were readministered to aid additional self-assessment and to add to research data.

In the winter and spring of 1958 research teams made visits for the purpose of re-rating all participants who were willing to continue as subjects in the experimentation. Characteristics in three areas of behavior described in the Rating Guide did change between pre-ratings and post-ratings, on a group basis, in both groups. The areas were: Interpersonal Relations, Intelligent Operation, and Emotional Stability. Such change would seem to indicate the effectiveness of the portions of the program designed to produce change in those areas. The pilot study had reported changes in characteristics in the areas of Adequacy of Communication and Operation as a Citizen.

Two possible reasons for the lack of improvement in the area of communication for the second group may have been: (1) the group had a high rating at the beginning; and (2) less emphasis was placed on communication skills in the second program. The only reason which presented itself for the lack of development in the area of citizenship was that the program depended on the incidental development of characteristics in that area. Both groups rated high in the area of Ethical and Moral Strength at the beginning of the experiments and failed to show growth during the period of experimentation.

Microfilm \$2.00; Xerox \$6.40. 135 pages.

AN EVALUATION OF THE INTERNSHIP IN EDUCATIONAL ADMINISTRATION WITH SPECIAL EMPHASIS ON THE EFFECTS ON THE INTERN

(L. C. Card No. Mic 58-5663)

Paul William Rossey, Ed.D. New York University, 1958

Chairman: Professor Walter A. Anderson

The problem of this investigation was an evaluation of the internship in educational administration as it had been utilized in the Middle Atlantic Region of the Cooperative Program in Educational Administration during the five years from 1949 to 1954. The administrative internship in education, somewhat like the more familiar medical internship, is designed to allow the potential educational administrator the opportunity to experience practical

situations and problems and to gain needed skills and competencies under the supervision and guidance of both university professors and successful practicing school administrators. One hundred and thirty-nine individuals participated in internships within the region during the five year period covered. Data were collected by means of a detailed questionnaire and personal interviews.

Usually the intern was placed with a school administrator, however some were placed as intern professors or with national and state offices of education or as interns with educational research, testing and publishing organizations. Fifty of the eighty-nine respondents were classroom teachers prior to the internship and twenty-two of this group (44%) assumed jobs other than as classroom teachers immediately following the internship experience. The median salary for positions prior to the internship was \$4030; median salary for internship positions was \$2655; and median salary for positions immediately following the internship was \$5107. The median age of interns at the beginning of the internship was 32.9 years, and the median of academic preparation prior to the internship was 67 semester credits beyond the bachelor's degree. A majority of internships reported (57.3%) were on a fulltime basis, 31.5% were on a half-time basis, and 11.2% were on an "extra-time" basis.

One hundred and seven specific activities in educational administration were listed in the questionnaire. The former interns reported that they had experienced 38.5% of the listed activities and that 65% of these specific activities experienced were new experiences for them. The respondents judged 66.9% of the experiences of the internship to be of "much value," 29.4% to be of "some value," and only 2.8% to be of "little or no value." The study showed that the high value of the internship was not dependent upon the types of internship positions held. Those activities judged by former interns to have been of highest value were the selection of teachers, the evaluation of architect's plans for new buildings, the presentation of proposed new construction programs to the community, the presentation and interpretation of school policies to the community, the preparation and presentation of reports to the board of education, and advising the board of education on the needs of children and the community. The activities judged of lowest value were the preparation of teacher contracts, the handling of discipline cases, the maintenance of census records, the coordination of orders, payments, and receipts, the investigation of absences, and the management and finance of the cafeteria.

Certain implications for the improvement of the internship were indicated. Individual needs of the intern must be more closely identified and met, sponsoring agencies must be most carefully selected, cooperating administrators must be more ably suited for the task they are called upon to perform, and interns must be subjected to continuous and individualized evaluation. With these improvements in effect, there is no limit to the future of the internship program for it possesses the very basic ideals of the learning opportunity. Continuous and provocative research will give the internship direction, and successful results will give it further meaning.

Without question, the findings show that the internship in educational administration had many positive effects upon the potential school administrator.

Microfilm \$2.15; Xerox \$7.60. 163 pages.

A STUDY OF THE SCHOLASTIC AND SOCIAL IMPLICATIONS OF REMEDIAL READING CLASSES IN SELECTED SENIOR HIGH SCHOOLS

(L. C. Card No. Mic 59-83)

Joseph T. Sandefur, Ed.D. Indiana University, 1958

Chairman: Raymond C. Gibson

Purposes

The purpose of the study was to determine by experimental methods the growth caused by a remedial reading program in the areas of (1) reading ability, (2) achievement in other scholastic areas, (3) verbal intelligence test scores, (4) personal and social adjustment, (5) desirable attitudes toward school, (6) school attendance, and (7) school holding power as indicated by drop-outs. Hypotheses were established which contended that improvement in reading would bring corresponding improvement in each of these areas.

Methods of Procedure

In May, 1957, 400 retarded readers from five schools were given the California Test of Reading, Intermediate Grades, Form AA. Of these retarded readers, 300 who had indicated grade levels of 8.9 or below were selected to participate in the study. The students were then equated on reading ability and divided into experimental and control groups of 150 each by a random decimal digits system. Of the 300 students, 267 enrolled in school in September, 1957. During the year, eight students transferred and twenty-eight dropped out leaving 231 students for whom complete data were obtained.

The experimental group participated in a remedial reading program during the entire school year of 1957-1958. The remedial program was based on the following materials:

Basic Reading Skills for High Schools, Scott Foresman Company.

SRA Better Reading, Books 1, 2, and 3, Science Research Association.

Real People Series, Books 1, 2, and 4, Row Peterson Company.

Standard Test Lessons in Reading, McCall-Crabb, Books C, D, and E, Teacher's College, Columbia University.

Modern Reading, Book 1, Charles E. Merrill Company.

Reading for Meaning, Books 6, 7, 8, 9, 10, and 11, J. B.

Lippincott Company.

In addition to the instructional materials, a large number of supplementary books adapted for poor readers were used to encourage reading for pleasure.

Both the experimental and control groups were given a series of tests in September and another series of tests of alternate forms in May to determine growth in the various areas. The testing program and schedule used for both groups were as follows:

May, 1957 - California Test of Reading, Intermediate Form AA.

September, 1957 - Otis Quick-Scoring Mental Ability Test, Beta A; California Personality Test, Intermediate Form AA; School Attitude Inventory.

May, 1958 - California Test of Reading, Intermediate From BB; Otis Quick-Scoring Mental Ability Test, Beta B; California Personality Test, Intermediate Form BB; School Attitude Inventory.

In addition to the data collected from the testing program, school attendance, drop-outs, and academic grades were taken from official school records in May, 1958.

The data of the two groups were compared and tested for significance by the T test. No comparison was considered statistically significant unless the probability value of the T score equaled at least the five per cent level of confidence.

Conclusions

- 1. The remedial students tended to make higher achievement in reading than did the control group.
- 2. Comprehension is more significantly improved by remedial training in reading than is vocabulary.
- 3. There is a significant relationship between reading and the Otis Mental Test.
- 4. Retarded readers tend to have personal and social maladjustments.
- 5. Remedial training in reading did not decrease personal and social maladjustments.
- 6. There is a definite relationship between reading and personality adjustment
- 7. There is a closer relationship between reading and social adjustment than between reading and personal adjustment.
- 8. There is a significant relationship between reading and scores made by the experimental students on the school attitude inventory.
- 9. The most significant factor in achieving high grade point averages is a high verbal intelligence test score.
- 10. School attendance has no significant relationship to reading ability, mental scores, personality and attitude measures, or grade point averages.
- 11. The drop-outs of the control group significantly exceeded those of the experimental group.

Microfilm \$2.00; Xerox \$6.20. 128 pages.

ADMINISTRATIVE PRACTICES AND FACILITIES OF TRAINING PROGRAMS FOR TRAINABLE MENTALLY RETARDED YOUTH

(L. C. Card No. Mic 58-7434)

Raymond Charles Schardein, Ed.D. University of Missouri, 1958

Supervisor: Loran G. Townsend

PURPOSE:

To survey administrative practices and facilities used in public-school training programs for trainable mentally retarded youth, and to compare such practices and facilities with the opinions of specialists in order that some criteria might be developed which would serve to guide school agencies in the implementation and administration of training centers in the State of Missouri.

METHOD OF RESEARCH:

Data for the study were collected chiefly through the use of an information blank prepared and distributed to six hundred training centers throughout twenty-eight states. Information used for comparative purposes was secured through the use of an identical form of the information blank which was distributed to eighty-two recognized specialists in the field of mental retardation. Other data were extracted from A Report of Special Census of Handicapped Children in Missouri, 1957-58 (not yet published), the Missouri School Laws, 1957 Supplement, and from an analysis of legislative acts and state regulations pertaining to public-school programs for these youth in the additional twenty-seven states.

CONCLUSIONS:

- 1. There are differences between present practices and the opinions of specialists; however, there are certain practices on which there is substantial agreement.
- 2. There is sufficient agreement among certain practices to suggest themselves strongly as criteria to be considered in the setting up of programs for trainable youth.

RECOMMENDATIONS:

- 1. Class Size. In terms of averages, it is probable that the minimum class size should not be less than 6 and the maximum class size should not be greater than 13.
- 2. Length of Training Programs. In general, classes for trainable youth should operate for about the same length of time as those for children of other classifications.
- 3. Classroom Teachers. Proper teaching of trainable youth and guidance of their parents require people well-trained and specialized in this field.
- 4. Other Professional Personnel. The most essential personnel, other than instructional, are: nurse, psychologist, physician, director of special education, and speech therapist.
- 5. Housing Provisions. (1) The most desirable housing arrangement for trainable youth is that of special classes in regular school buildings; (2) an all-purpose room, a nurse's room, and ample playground space are essential.
- 6. Classrooms and Facilities. (1) Classrooms should be located on the first floor near building exits; (2) storage space for large items of equipment should be provided; (3) lockers or compartments for wraps and individual supplies are desirable facilities; (4) lavatory basins with running water should be provided within the classrooms; and (5) toilet facilities should be provided as an enclosure of the regular classroom, or as a separate facility close to the classroom, depending upon the age of the youth.
- 7. Eligibility and Placement. (1) A physical examination, a psychological examination, and a social investigation should be minimum requirements for admission; (2) the psychological examination should include (a) an individual intelligence test, (b) a performance test, and (c) a social maturity test; (3) the social investigation should include (a) a personal history, (b) a family history, and (c) an appraisal of the environmental background for each child; (4) other eligibility requirements, in terms of the functioning of the child, should include the following: (a) child should be ambulatory, (b) possess stable temperament, (c) understand simple directions, (d) be able to feed self, and (3) be toilet trained.

- 8. Curriculum. The curriculum should emphasize (1) self-care, including safety; (2) social adjustment; (3) sensory training; (4) economic usefulness in home and sheltered environment; (5) physical training; (6) music; and (7) handicrafts.
- 9. Transportation. (1) School district(s) should furnish transportation wherever practicable; (2) the distance traveled one-way should not exceed an average distance of 10 miles; and (3) board and lodging facilities should not be provided in lieu of transportation.

Microfilm \$3.30; Xerox \$14.20. 255 pages.

NEW JERSEY SCHOOL PROPERTY INSURANCE

(L. C. Card No. Mic 59-317)

George Schneider, Ed.D. Temple University, 1958

Adviser: Dr. Leon Ovsiew

<u>Problem:</u> This is a study of school insurance practices in New Jersey, and a comparison of present methods and costs of insuring public school real property with a proposed state insurance fund plan.

Methods and Procedures: A study of the legal status and history of insurance of public school property in New Jersey and in state operating "self-insurance" programs was made, using both Statutes, rulings of the Commissioners, and reference material.

A pretested questionnaire concerning current practices, costs and fire losses in final form was mailed to four hundred and five New Jersey school districts having real property during the year 1954-1955.

A plan for organizing and operating a New Jersey State Insurance Fund for insuring public school property was developed and reviewed by experts in the field.

Findings: Seventy-seven and three-tenths per cent of the school districts of the State that owned school buildings in the school year 1954-1955 responded to the questionnaire. The distribution of replies indicate adequate geographical and size representatives.

A list of findings follows:

- 1. The Statutes of the State make the Department of Education responsible for setting standards for school buildings and requirements for protecting these buildings from fire losses.
- 2. Title to public school property is vested in the school board.
- 3. Both stock and mutual companies underwrite school property insurance employing specific schedules and policies.
- 4. Co-insurance clauses were in the policies of eighty per cent of the districts.
- 5. The most common co-insurance rate was eighty per cent.
- Extended coverage protection was provided in eighty-four per cent of the districts responding to the questionnaire.

- 7. Twenty-two per cent of appraisals reported were made four years or more ago.
- 8. Over fifty per cent of appraisals were made by insurance agents with the predominant remainder being made by appraisal companies, school boards and insurance company engineers.
- 9. Total valuation of all school property of all districts in the State was estimated at \$846,763,425 with a total insurance coverage estimated at \$718,869,460.
- 10. Insurance coverage represented eighty-four per cent of valuation.
- 11. Outlay of premium each year for the insurance coverage on all public schools was estimated at \$1,093,000.
- 12. Fire losses reported by four hundred and five school districts for the five-year period (1950-1955) were \$1,187,472 with an average fire loss per year of \$237,494.
- 13. Reported losses were 28.12 per cent of premiums paid.
- 14. About two per cent of the buildings owned by the reporting districts had fire or extended coverage loss each year on the average for the five-year period.
- 15. Total average fire loss for all public schools of the State was estimated at \$310,192 annually for the period 1950-1955.
- 16. The average loss per claim was \$8,189.
- 17. Four states Alabama, North Dakota, South Carolina, and Wisconsin operate insurance funds covering state property, including school buildings. Findings concerning the operation of these respective five Funds are included in the writing.

Conclusions:

- The adequate of insurance coverage is dependent upon a knowledge of the current value of the property insured.
- 2. Insurance rates for school property insurance in New Jersey for the period 1950-1955 were higher than was necessary to meet the requirements of good underwriting.
- State-operated insurance funds have been successful for many years both from the standpoint of the insured and the standpoint of sound insurance business practices.
- 4. State insurance funds have shown that they can operate with expenses less than ten per cent of earned premiums. Compared with stock insurance company expense ratios averaging between forty-five and fifty per cent, savings in insurance cost to school districts have resulted from this difference in operating expense.
- 5. A New Jersey Insurance Fund could provide improved inspection service for the school districts of the State.
- 6. A New Jersey Insurance Fund could save local

school boards as much as \$500,000 a year on insurance costs, as well as time and effort in the handling of their property insurance.

Recommendation: It is recommended that a state insurance fund be created to insure public school property of New Jersey according to the plan outlined in this writing.

Microfilm \$2.00; Xerox \$5.20. 105 pages.

A STUDY OF LOCAL SOURCES OF SUPPORT OF LOCAL GOVERNMENTAL AGENCIES IN TWENTY-THREE SELECTED TENNESSEE COUNTIES

(L. C. Card No. Mic 58-7604)

William Bascom Stradley, Ed.D. The University of Tennessee, 1958

Major Professor: John W. Gilliland

The purpose of this study was to examine and analyze the local sources of revenue and their local allocation in support of local governmental agencies, including the schools. That there was need for greater local support for schools appeared to be a justified assumption. In the face of frequently expressed opinions that there were many localities in Tennessee which were not able to provide greater local support for education, this study was undertaken in an effort to determine what was the status in 1957 of local revenue receipts and how these revenue receipts were allocated locally to support local governmental agencies.

It was decided that an analysis of the annual audit reports should provide the desired information. Since a related study was under way in reference to municipalities, this study was restricted to county units of government. For uniformity of audit reporting it was further decided to restrict the study to counties which had been audited by the staff of the Office of the Tennessee State Comptroller. Sixty-nine such audits had been completed when this study was begun. It was decided that one-third of this number would be adequate for this study. A random sample of twenty-three counties was selected. A study of the sample has shown that it was adequate in terms of geographical location, population, assessed wealth, estimated taxable wealth and relative taxpaying ability.

The audit reports of the selected counties were then carefully analyzed. The first analysis was of the revenue receipts of the counties from all sources—state, federal, and local—with special attention to revenue receipts from local sources. The second analysis was of the distribution of the revenue receipts as they were disbursed in the purchase of services by the various local governmental agencies.

The analysis of revenue receipts revealed that for the median county approximately 25 per cent of all revenue receipts came from local sources, with the state providing approximately 72 per cent, and the federal government providing approximately 3 per cent of all revenue receipts. The general property tax provided about three-fourths of the local revenue receipts. Thus the general property tax provided about three-sixteenths of all the locally spent revenue receipts. It was poorly administered. The average ratio of assessed value to actual market value of real

property was 3 per cent lower than for the preceding year. The pressure of local politics made it unpopular for the locally elected tax assessor to attempt to do an adequate administration of the present laws concerning the assessment of property. The effective tax levy for the state averaged sixty-six cents per \$100 of market value, and for the selected counties the effective tax levy averaged sixty-two cents. The state average was thirteen cents lower than that of the previous year. Another fact that appeared was that accounting procedures and governmental structures were awkard and inefficient.

The analysis of local allocations of revenue receipts to the various governmental agencies yielded several significant facts: Local effort to support roads showed a definite tendency to let the state bear the burden. The smaller the county the more it allowed the state to assume the burden for the support of schools. There appeared to be no consistent pattern of effort to support welfare programs, except the payment of social security for county employees which was fairly common. The smaller counties tended to spend a larger portion of their total local revenue receipts in the operation of a general fund account—or, in the operation of the courthouse offices. A high direct relationship was apparent between the size of population and the per cent which local contribution was to the total receipts for the support of local governmental agencies.

Microfilm \$2.00; Xerox \$6.20. 130 pages.

A STUDY OF THE JOB REQUIREMENTS OF ELECTRONIC INDUSTRIES AND THE ELECTRONICS TECHNOLOGY CURRICULUM OF TEMPLE UNIVERSITY TECHNICAL INSTITUTE

(L. C. Card No. Mic 59-319)

John W. Trego, Ed.D. Temple University, 1958

The purpose of this investigation was to determine the extent of which the electronics technology curriculum of Temple University Technical Institute was meeting the job requirements of technicians as rated by employers in the electronics industry. Evaluation of the curriculum was made in terms of data gathered on the rated importance of specific knowledges, skills and understandings in the curriculum areas of electronics, mathematics, and physics.

The need for this study was emphasized in the literature, where it was stated that the graduate of a technical institute is expected to be able to put his skills to immediate use in both large and small companies, varied job areas, and in any one of many types of industries. Therefore, it became essential that the curricula of technical institutes be closely adapted to the objectives of vocational placement and the specific needs of industry. This makes it imperative for each technical institute to determine the extent to which its curriculum are meeting the job requirements in the occupations for which training is given.

The device used to make inquiries concerning the problem for this investigation was An Inventory of the Knowledges, Skills and Understandings Required by Industrial Organizations Which Employ Electronic Technicians. The inventory was completed after it was submitted on a trial run basis to a selected list of industrial personnel and educators. The final form of the inventory consisted of 147 items representing specific knowledges and skills with appropriate rating scales.

To add validity to the data collected, an attempt was made to include not only all known electronic companies on a national scale, but to invite personnel with varying duties and responsibilities within each organization to participate in the study. Eventually, the printed Inventory of the Knowledges, Skills and Understandings Required by Industrial Organizations Which Employ Electronic Technicians, was mailed to a list of 250 persons in the electronics industry. As a result of all efforts, 175 usable replies were received from executives, engineers, personnel workers, and supervisors, representing 106 electronic companies or divisions of electronic organizations.

The descriptive information assembled from the inventories returned disclosed that the respondents were well qualified by title to make competent judgments and to give valid answers to the inventory. There was a desirable diversification of products and job areas of the participating electronic companies, as reported by the respondents. The primary service areas of the Technical Institute of Temple University, the Philadelphia area and the Middle Atlantic States region, were well represented by 67.4 per cent of the total responses to the inventory.

The method of expert opinion was utilized to determine the emphasis placed upon the separate inventory items by the electronics technology curriculum of Temple University Technical Institute. Ten members of the faculty were selected by the administrators of the program as those qualified to pass judgment upon the entire electronics curriculum. Evaluation of the curriculum was made in terms of the degree of emphasis placed by the faculty upon each specific knowledge and skill in the inventory as collated with the needs and desires of industry as expressed by the 175 employers of electronic technicians.

The summary expression of relationship and interpretation within the context of the data, gave rise to the following conclusions drawn on the problem for this study.

- 1. A majority of the company executives, engineers, personnel workers, and supervisors were inclined to stress preparation in basic principles and fundamental skills, and to place considerably less importance upon achievement in the more specialized concept areas and skills.
- 2. The electronics technology curriculum of Temple University Technical Institute placed greater emphasis upon theoretical considerations of the technology than upon the more practical aspects.
- 3. Except in the development of some specific skills, the electronics technology curriculum as interpreted by the faculty of the Technical Institute of Temple University, has been rated as meeting or exceeding the job requirements of technicians as rated by employers in the electronics industry.

In general it was recommended that the faculty of Temple University Technical Institute give consideration to changes in course content and curriculum revision in light of the evidence presented in the study and the conclusions drawn.

Microfilm \$2.05; Xerox \$7.40. 156 pages.

THE DEVELOPMENT OF A MERIT SALARY SCHEDULE FOR THE TEACHING PERSONNEL OF SARASOTA COUNTY PUBLIC SCHOOLS

1981

(L. C. Card No. Mic 59-636)

Russell Ware Wiley, Ed.D. Syracuse University, 1958

Supervisor: Paul M. Halverson

The purpose of this study is to describe, analyze, and evaluate the processes employed by the Sarasota County school system in developing and implementing a merit-salary schedule for its teaching personnel. These processes are presented through the following procedures.

- 1. Identifying of areas for investigation and the establishment of sub-committees to study and report their findings and recommendations for the consideration of the master salary committee.
- 2. Searching and itemizing of the professional literature in education for the last twenty years. Professional literature here implies bulletins, pamphlets, brochures, and articles in professional publications. The purpose of this step was to find definitions, objectives, principles, and procedures of merit-rating and merit-salary schedules.
- Reporting and action and/or consequences of certain events that influenced the working of the Salary Committee. Such as:
 - A. The results of Legislative action, May 1957, upon teacher salaries in the State of Florida and in Sarasota County for the school year of 1957-1958.
 - B. The preliminary report of the Salary Committee for the consideration and criticism of the Sarasota County Board of Public Instruction.
 - C. The reaction of the Board of Public Instruction based upon its study of the preliminary report of the Salary Committee.
 - D. The revised report of the Salary Committee based upon a further study of merit-salaries.
 - E. The acceptance and implementation of the meritsalary schedule by the Board of Public Instruction.
- 4. Evaluating the selected definitions, objectives, principles, and procedures established in this meritsalary schedule.

The conclusions drawn from this study are of a factual nature, related to the salary problems, the function of the Salary Committee, and the development of a merit-salary schedule for the teachers of the Sarasota County schools.

These conclusions, therefore, should be interpreted as objective evidence of what took place at one time, in one place, under certain conditions. As such, they may offer encouragement to other school systems to (1) promote more actively the processes of group action, (2) study more objectively the ramifications of teacher evaluation and teacher rating, (3) consider honestly and seriously the responsibility of school personnel in developing patterns of attitudes and action for becoming professional members of a recognized profession.

Microfilm \$3.00; Xerox \$10.40. 232 pages.

THE ROLE OF THE DEAN OF MEN IN INSTITUTIONS OF HIGHER LEARNING

(L. C. Card No. Mic 58-7606)

Harold L. Willey, Ed.D. The University of Tennessee, 1958

Major Professor: Orin B. Graff

The problem of this study was to define more adequately the role of the dean of men in institutions of higher learning. In order to achieve this task the following specific steps were necessary:

1. Project a philosophical construct for analysis of principal tasks identified with the job, dean of men.

2. Determine the tasks currently identified with the job, dean of men.

3. Determine the know-how currently identified with the job.

4. Evaluate the job, dean of men at Marshall College, using the construct developed as a criterion.

A personal interview was held with deans of men in fifteen colleges and universities. The interview guide used consisted of three major areas: the job (tasks being performed), the theory, and the know-how needed to perform the tasks.

Findings

- 1. The detailed administrative organization of student personnel services varied from campus to campus.
- 2. The job, dean of men, had not been clearly defined in the institutions of higher learning involved in the study.
- 3. The deans of men at the institutions studied seemed to function according to the philosophy the institution held about the individual and how he learned.
- 4. The study revealed a basic need on most campuses for effective communication between departments and divisions of the various colleges and universities.
- 5. As institutions of higher learning become larger and more complex there is need for a more centralized organization of student personnel services.
- 6. The growth and increasing complexity of many of the institutions studied necessitated the development of summer orientation programs.
- 7. Each institution surveyed considered the residence hall as an integral part of its total institutional program and not merely a place to eat and live.
- 8. Each institution studied accepted the idea that the disciplinary program should be closely correlated with the educational goals of the institution.
- 9. There seemed to be a trend in most institutions to place greater responsibility upon student judicial bodies.

Microfilm \$3.95; Xerox \$13.40. 307 pages.

STUDY OF THE INFLUENCE OF RAPID COMMUNITY GROWTH UPON ADMINISTRATIVE POLICIES AND PRACTICES IN A SUBURBAN SCHOOL SYSTEM

(L. C. Card No. Mic 59-637)

Cary Eugene Wood, Ed.D. Syracuse University, 1958

This study was an attempt to analyze the influence of rapid growth upon administrative policies and practices in the suburban school system of North Syracuse, New York. Rapid growth was defined as sufficient increases in the population, specifically children, of a school district to create immediate and unusual stresses on the educational program of this district. The average daily attendance for a given year would be at least 10 per cent greater than the mean of the previous three years.

The underlying hypothesis was that to administer a rapidly growing suburban school system, it is necessary to develop new policies and practices to replace old ones established in more static times.

Historical, descriptive-survey, and case study techniques were used in collecting data. Primary sources included personal interviews, a questionnaire, newspapers, letters, manuscripts, scrapbooks, legal documents, census records, pictures, and a variety of documents and remains of the school system studied.

Although the writer traced the history of educational developments in the North Syracuse area from the time of the first classroom, the main discourse centered on the post-centralization period from June 29, 1949, through June 30, 1957. Comparisons were made in many instances with other rapidly growing school systems; specifically with Levittown and Bethpage, Long Island, New York.

Synthesis was achieved through a combination of chronological and topical organization of data. All major areas of the school program were studied with the exception of the curriculum.

The effect of rapid growth was felt most keenly in aspects of finance and business management, housing, transportation, pupil personnel, and staffing, although its influence, in reality, could not be divorced from any phase of administration studied. Some of the more important findings are given in the material which follows.

The use of lay advisory committees was apparently the key factor in gaining public support for bond issues and certain other elements of the school program.

New types of full-time administrators were employed as the district grew. These included the following: business manager, coordinator of transportation, coordinator of buildings and grounds, coordinator of school lunch, director of adult education, and pupil personnel accountant.

The need for new housing made necessary long-range financial planning. It was found that building new housing was cheaper than renting facilities. The State Education Department discouraged building temporary housing by the district.

Because of increased complexity in finance and business management, new accounting procedures were instituted. Greater use was made of machines by the business department.

Rapid growth affected adversely communication among teachers and between teachers and administrators. The use of principals' and teachers' councils helped to alleviate this difficulty.

New problems of division of labor and responsibilities of employees developed. The Board of Education had yet to complete a written statement of policies and practices for the district outside of the minutes of the Board.

It was found that North Syracuse employed, as did other districts in the area, disproportionate numbers of new and inexperienced teachers in staffing elementary classrooms. This presented new problems of continuity and stability to the school.

The main conclusion is, then, that as new problems developed in this suburban school system because of rapid growth, it was necessary to develop new policies and practices to cope with them. The writer generalizes that similar problems will arise in any growing suburban district necessitating new procedures for their solution to replace old ones established when school enrollments were more stable. How these are developed will depend partly upon the character of the needs and partly upon such elements as the philosophy and the financial ability of the district.

Microfilm \$5.80; Xerox \$20.40. 454 pages.

EDUCATION, ADULT

TRENDS IN PUBLIC SCHOOL ADULT EDUCATION

(L. C. Card No. Mic 58-7596)

Funson Edwards, Ed.D. The University of Tennessee, 1958

Major Professor: Orin B. Graff

This study, Trends in Public School Adult Education, was developed through the use of three major sources: review of literature, adult school questionnaire, and conferences.

The questionnaire contained twenty-one adult school trends identified in literature and submitted to 108 adult school directors for verification. A sixty-two per cent response was secured. Directors gave least response to trends in finance and greatest response to trends in organization and administration. Responses revealed some unrelated patterns of operation and procedure.

Listed are the twenty-one adult school trends with response percentages of acceptance or rejection.

	This is a	The Oppo- site is a		Not	No Re-
Trend	Trend	Trend	Unclear	Known	sponse
Establishing an adult education					
department	71.87	3.13	14.06	4.69	6.25
2. Designating an adult school					
director	70.31	1.56	9.37	7.81	10.94
Increasing size of adult education					
department staff	43.75	3.13	39.06	7.81	10.94
4. Conducting both morning and eve-					
ning classes	45.31	17.19	15.63	12.50	9.37

	This is a	The Opposite is a	The Trend is	Not	No Re-
Trend	Trend	Trend	Unclear	Known	sponse
5. Using only day					
school facilities 6. Financed as part of public	39.06	10.94	28.13	12.50	9.37
school system 7. Using criteria to determine	46.87	7.81	25.00	6.25	14.06
state aid 8. Charging only	28.13	7.81	28.13	15.63	17.19
nominal course fees 9. Using day	43.75	7.81	26.56	6.25	15.63
school schedule for teachers' pay	32.81	10.94	35.94	6.25	14.06
0. Cost of adult school pro- gram interms of salaries and instructional					
supplies 1. Increased en-	31.25	3.13	25.00	25.00	15.63
rollments in adult education 12. Reducing the	59.37	3.13	20.31	9.37	7.81
size of adult classes 13. Emphasis on	31.25	14.06	35.94	6.25	12.50
Family-life cycle courses 14. Placing em-	34.37	10.94	34.37	15.63	4.69
phasis on indi- vidual needs 15. Using group discussion	48.44	4.69	21.87	9.37	15.63
methods of teaching 16. Placing em- phasis on moral	46.87	9.37	18.75	10.94	14.06
and spiritual values 17. Enlisting sup- port from com-	26.56	4.69	37.50	9.37	21.87
munity organi- zations 18. Keeping public informed of adu	59.37	4.69	14.06	9.37	12.50
school program 19. Recognizing need for teach- ers with special	59.37	1.56	17.19	6.25	15.63
training in adult education 20. Emphasizing need for teacher	42.18	10.94	28.13	14.06	4.69
pupil conferences 21. Greater pupil	35.94	6.25	29.69	9.37	18.7
freedom in cour	56	4.69	18.75		17.19

every area of adult education. A trend toward increased liberal adult education was revealed. Vocational courses still predominate in adult education although interest is currently much higher in other areas. Adult school personnel were community conscious, seeking to inform the public of their school objectives and progress. Most adult school officials continued to rely upon local financial support for operation of their program. Comparatively few research studies had been conducted in the area of adult education. Improved evaluative criteria and better defined purposes were expressed as needs.

Microfilm \$2.70; Xerox \$9.40. 208 pages.

SOME FARM BUSINESS FACTORS DIFFERENTIATING
EARNINGS OF FARMERS IN THE
MINNESOTA VOCATIONAL AGRICULTURE
FARM MANAGEMENT PROGRAM

(L. C. Card No. Mic 58-7418)

Lauren B. Granger, Ph.D. University of Minnesota, 1958

Adviser: Milo J. Peterson

The farm business records of 265 farmers who were enrolled in the Minnesota vocational agriculture farm management program in sixty-three public schools for the year 1956 were investigated. A sample of 238 farms was included in the study. The sample was divided into six regional groups of farms on a geographic basis throughout Minnesota and all of the analysis work was conducted on a regional basis for each of the six groups of farms.

The purpose of the study was to determine on a regional basis for each of the six groups of farms the relationship between farm earnings variation and the fifteen following farm business factors: (1) crop yields, (2) crop selection, (3) feeding efficiency, (4) livestock units per 100 acres, (5) work units, (6) work units per worker, (7) power, machinery, building and equipment expense per work unit, (8) years for receipts to equal capital, (9) work units per \$1000 capital, (10) livestock and livestock product sales per animal unit, (11) gross farm receipts per worker, (12) gross farm receipts per acre, (13) gross farm expense per dollar receipts, (14) value fertilizer purchases per acre, and (15) power and machinery costs per acre.

Multiple regression techniques and analysis of variance procedures along with t tests of the individual regression coefficients were used to analyze the data and to determine if there were significant relationships between the farm earnings and the fifteen individual independent farm business factors for each of the six groups of farms.

The analysis revealed the following results:

1. No significant differences at the five per cent or higher levels were found between farm earnings variation and the seven individual farm business factors (1) crop yields, (2) feeding efficiency, (3) livestock units per 100 acres, (4) power, machinery, building and equipment expense per work unit, (5) gross receipts per acre, (6) value fertilizer purchases per acre, and (7) power and machinery costs per acre in each of the six regional groups of farms.

- 2. Significant differences at the five per cent or higher levels were found between farm earnings variation and the three farm business factors (1) crop selection, (2) work units per \$1000 capital, and (3) livestock and livestock product sales per animal unit. Each factor was significant in a difference region.
- 3. Significant differences at the five per cent or higher levels were found between farm earnings variation and the one factor-years for receipts to equal capital-among the farms studied in two of the six regions.
- 4. Significant differences at the five per cent or higher levels were found between farm earnings variation and the farm business factor-work units per worker -in three of the regional groups of farms.
- 5. Significant differences at the five per cent or higher levels were found between farm earnings variation and the two farm business factors (1) work units and (2) gross receipts per worker in four of the regional groups of farms.
- 6. Significant differences at the five per cent or higher levels were found between farm earnings variation and the one individual farm business factor-gross farm expense per dollar receipts-in five of the six regional groups of farms.
- 7. Significant differences at the five per cent or higher levels were found between farm earnings variation and the multiple correlations when the multiple correlation coefficients were tested as a whole for each of the six regional groups of farms.

Microfilm \$3.50; Xerox \$12.00. 272 pages.

ADULT COLLEGE STUDENTS: AN ANALYSIS
OF CERTAIN FACTORS RELATED TO THE
CHARACTERISTICS OF STUDENTS ATTENDING
A UNIVERSITY ADULT COLLEGE

(L. C. Card No. Mic 58-7226)

Alan Boyd Knox, Ed.D. Syracuse University, 1958

The purpose of this study was to determine the characteristics of adult students attending a university adult college.

In chapter one the problem was introduced by indicating the importance of additional information about adult college students, describing the nature of the adult college, presenting information about the adult student provided by previous research, and describing problems confronted by teacher, counselor and administrator due to inadequate information about adult students.

In chapters two and three the research design and populations were described. In this study the adult college population consisted of the group of adult students enrolled in the Syracuse program of University College, the adult education division of Syracuse University. All data were obtained during the second semester of 1955-56. Data were available for about 90 percent of the students. In order to obtain comparisons, the total adult college population was divided into sub-populations based on credit and degree status. The data describing the student were

obtained from their personnel cards and from a questionnaire which they completed in their classes.

The adult college population was compared with the population of students residing in the metropolitan Syracuse area. The data describing the community population were obtained from the U.S. Census summaries for the county.

Chapters four through seven presented a description and comparison of the nature of the adult students in terms of personnel characteristics (such as age, family responsibility, and place of residence), occupational characteristics, reasons for attendance, and educational background, activities and goals.

Chapter eight provided a summary of the study and suggested implications for program development and further research.

This study described sub-populations within the adult college and provided a possible method of clientele analysis. The findings were valuable because of the specific information obtained in the description and comparison of populations. The general findings were as follows.

- Motivation Three-quarters of the students selected a vocational reason for attending and one-quarter selected a cultural reason as their first choice. An increasing proportion of second and third choices were cultural.
- 2. Pattern of Attendance Four-fifths of the students had attended the adult college in the previous year.
- 3. <u>Level of Education</u> One eighth of the students had completed no college courses and one-quarter had completed a bachelors degree or more. Men and women students had the same amount of education.
- 4. Financial aid Half of the students received financial aid for their education.
- 5. <u>Life Roles</u> Older students tended to be married and have grown children, to have higher status occupations, to have more education, and more often to select cultural courses.
- 6. Academic status A majority of the credit students were between twenty-five and thirty-four years while non-credit students were in general younger or older. Most of the students who were matriculated for a degree, attended for vocational reasons and attended regularly.
- 7. Status and Responsibility A majority of the students were in the upper middle class in terms of status level of occupation and area of residence. Nearly all of the students were employed full time.
- 8. Sub-populations This study provided a basis for the development of programs and administrative procedures appropriate for the sub-populations of students which were described.

Information about adult students which may be easily obtained in a clientele analysis was described in this inquiry. The use of periodic analyses could provide indices which could indicate change of student body under changing conditions. A comparison of similar analyses in different institutions could identify common characteristics as compared with those which relate specifically to the nature of individual communities or programs.

Microfilm \$4.55; Xerox \$15.20. 353 pages.

STATUS AND TRENDS OF ADULT EDUCATION IN THE PUBLIC SCHOOLS OF MISSOURI

(L. C. Card No. Mic 58-7436)

Merrill Delwin Williamson, Ed.D. University of Missouri, 1958

Supervisor: H. H. London

Purpose of Study: The purpose of this study was to ascertain the status and trends of adult education in the public schools of Missouri.

Method of Research: Data were obtained from: records of the Missouri State Department of Education; information forms sent to adults enrolled in reimbursable and non-reimbursable adult courses in selected public schools of Missouri, to administrators in Missouri public schools having adult education programs, and to public school administrators and lay leaders in Missouri communities having limited or no public school adult education program.

Summary: Adult education is offered in communities of all sizes in the State of Missouri. Enrollment in reimbursable adult courses remained relatively constant from 1952 to 1958 while increasing by 18 per cent in non-reimbursable adult courses during this period.

Most schools required a minimum of ten adults to organize a class. Class sessions were most frequently two hours in length and a majority of the courses were nine to fourteen weeks in length. Classes generally meet only once per week.

Public school administrators anticipated that the greatest growth in adult education in the future would be in general adult courses.

Superintendents, coordinators, and directors of adult education most often supervised adult classes.

Fees for adult courses ranged from \$1.00 to \$30.00 in 1958 compared to an average of \$9.05 in 1952. Teachers were paid at the average hourly rate of \$4.20 in 1958 as compared to \$3.00 in 1952.

There tended to be agreement among adult students, public school administrators, and lay leaders that adults should bear a part of the financial responsibility for their education in addition to support from federal, state, and local funds.

Of the 993 adult teachers reported, 66 per cent were men, 70 per cent were college graduates, and 68 per cent were professionally trained.

A majority of the adult students were between the ages of 21 and 45 and they were employed primarily in clerical and sales, skilled, and homemaking occupations. They were generally better educated than the average Missouri adult. They were attending classes mostly for general self-improvement and for advancement in their work.

Community lay leaders indicated that public school facilities should be used for adult education. A majority indicated a need for adult courses of the general self-improvement and vocational improvement types. Sixty per cent of the lay leaders expressed an interest in attending adult classes.

The chief reason given for discontinuing offering adult courses was a lack of adult interest.

Problems anticipated by administrators in developing adult education programs were primarily those of finance

and obtaining an adequate number of students. They indicated that general adult courses were the types most needed in their communities.

Conclusions: Enrollment in adult education in Missouri is not increasing as rapidly as in the nation as a whole.

Public school administrators, students, and lay leaders tend to favor the use of federal, state, and local funds in combination with student fees for the support of adult education.

The instruction that adults are receiving is generally meeting their needs to a high degree.

Many of the smaller communities have neither the financial resources nor a sufficient demand for adult education other than vocational agriculture.

Lay leaders generally believe that their communities have a need for adult education and that it is the obligation of the public school to provide such education.

Problems faced by public school administrators in developing adult education programs in Missouri communities vary in degree more than in kind.

Microfilm \$3.70; Xerox \$12.60. 286 pages.

EDUCATION, HISTORY

THE COLLEGE OF EDUCATION
UNIVERSITY OF GEORGIA, AND THE DEVELOPMENT
OF TEACHER EDUCATION, 1908-1958

(L. C. Card No. Mic 58-5978)

John B. Burks, Ed.D. University of Georgia, 1958

PURPOSE OF THE STUDY

The purpose of this study was to examine the history of the College of Education, University of Georgia, in the light of the institution's objectives, problems, and achievements, and trace the development of teacher education from 1908 to 1958.

SCOPE AND LIMITATIONS

The study has been directed toward the background, origin, growth, and development of the College of Education of the University of Georgia and the role of the College in the development of professional teacher-education programs during the twentieth century.

This research report does not purport to be a history of teacher education, <u>per se</u> or a history of the normal school movement. No attempt has been made to give a general history of education in Georgia.

METHOD USED

The historical method was used in this study. Relevant primary and secondary data were used to make the narrative account of the events and personalities that have participated in the origin, growth, and development of the College of Education, University of Georgia, and the College's programs of teacher education.

SOURCES OF DATA

The data used in the development of the report of this study were found in the Special Collections and Georgiana Section of the Ilah Dunlap Little Memorial Library, University of Georgia; the office of the Dean of the College of Education, University of Georgia; the office of the Dean of the Graduate School, University of Georgia; State Department of Education, Atlanta, Georgia; the Office of the Georgia Education Association, Atlanta, Georgia; and the Office of the Board of Regents, University System of Georgia, Atlanta, Georgia.

Personal reminiscences concerning his administration as Dean of the College of Education were secured from Dr. J. C. Meadows.

The following College personnel made records available and gave pertinent advice during the research study and the preparation of the report: Dr. John A. Dotson, Dean of the College of Education; Dr. James E. Greene, Chairman of the Division of Graduate Studies, College of Education; Dr. Robert Travis Osborne, Director of the Guidance Center, University of Georgia; Miss Jennie Beer, Secretary, College of Education; Mrs. Betty Fields, Secretary, College of Education; Mrs. Virginia Robertson, Secretary, College of Education; Mrs. Martha A. Thurman, Secretary, Graduate School, University of Georgia; and Mrs. Kathleen Broadhurst, Assistant Professor Library, University of Georgia. Invaluable assistance in locating old records, reports, and manuscripts, as well as other materials, was given by Mrs. Susan B. Tate and Mr. John W. Bonner, Jr., librarians in the Special Collections Section of the University Library.

The most valuable data were acquired from the following primary sources: Minutes of the faculty of Franklin College; Minutes of the Trustees; Minutes of Trustee Committees; Annual Reports of the Deans of the College of Education; Annual Reports of the Dean of the Peabody School of Education, University of Georgia; Annual Reports of the University Chancellors; Board of Regents Annual Reports; files of original papers of Dr. T. J. Woofter; files of original papers of Dr. J. S. Steward; personal scrapebooks and diary of Dr. J. S. Stewart; Catalogs of Peabody School of Education, the College of Education, and the University of Georgia; original letters of officials of the College of Education and the University of Georgia.

Other valuable data were secured from such secondary sources as reports in collections of the Alumni Record; the Red and Black, University student newspaper; and newspapers of Athens, Dahlonega, Marietta, and Atlanta, Georgia.

THE FINDINGS

The College of Education, University of Georgia, was created on June 13, 1908, by the Board of Trustees of the University of Georgia. At the same time two degree programs, the A.B. and the B.S. in Education, were approved, and Dr. T. J. Woofter was elected Dean. Peabody Hall which houses the College of Education today was constructed during 1912-13 with a \$40,000 grant from the George Peabody Fund.

The College of Education was known as the Peabody School of Education from 1908 until 1932 when the Board of Regents was created by legislative action to organize and direct the entire program of higher education in Georgia. Dr. Woofter served as Dean during the period when the institution was known as the Peabody School of Education and under the administration of the Trustees. During his administration many movements and many programs were begun which are in operation in the College of Education today. Among the more important are the following:

- (1) Summer school program for teachers was organized.
- (2) The University Departments of Philosophy, Psychology, and Sociology were organized as departments in the School of Education.
- (3) Interdisciplinary approach was started in 1915.
- (4) Program for the preparation of vocational teachers was begun in 1917.
- (5) Women were admitted to the University through the College of Education in September, 1919.
- (6) First University correspondence courses were taught by the School of Education in 1922; first extension class was taught by the School of Education in Toccoa, Georgia, in 1924.
- (7) Program of observation, participation, and student teaching had its beginning in 1925.
- (8) Teacher placement services were organized in 1927.
- (9) The Bureaus of Educational Counsel and Educational Research were organized in 1930.
- (10) In 1930, the first graduate degree, M.A. in Education, was approved.

In 1931, Dr. Woofter became Dean Emeritus and Dr. J. C. Meadows became Dean of the new College of Education. At this time, State Teachers College was combined with the College of Education and Dr. Jere M. Pound served one year as President of the College of Education.

During the administration of Dr. Walter D. Cocking, much emphasis was given to the graduate program. The Ph.D. degree was authorized in 1938 and the first Ph.D. degree in Education was awarded by the College of Education in 1940. In 1950, the doctoral program was changed to the Ed.D. degree program.

Dr. Edwin D. Pusey served as Acting Dean from 1941 until 1944 when Dr. Kenneth R. Williams was elected. Some of the main developments during Dr. Williams' administration were the close cooperation of the College with the State Agricultural and Industrial Development Board through the Educational Panel, the organization of off-campus teacher education workshops, the organization of Saturday classes, and the Atlanta Area Teacher Education Service.

During Dr. O. C. Aderhold's administration as Dean, the College gave emphasis to establishing definite aims and objectives in teacher education based on the Georgia needs as shown in the Survey of Public Education of Less Than College Grade. Emphasis was also given by the College of Education to nutrition education, to distributive education, to on-the-job training of teachers, and to providing field services and the promotion of conferences on teacher education and rural life.

Since 1950, under the leadership of Dean John A. Dotson, the College has added an audio-visual program; the program for exceptional children, including special education and speech correction; the Six-Year Program; as well as increasing the emphasis on graduate study. The College

has cooperated in the Kellogg study to improve educational administration and the Cooperative Program in Elementary Education. Microfilm \$3.60; Xerox \$12.20. 277 pages.

A HISTORY OF JUNIOR HIGH SCHOOLS IN OREGON, 1914-1957

(L. C. Card No. Mic 58-3944)

Erwin J. Juilfs, Ed.D. University of Oregon, 1958

Adviser: A. C. Hearn

This study reveals a pattern of growth for the junior high schools of Oregon which quite generally parallels that of reorganized schools throughout the nation. Research, based, for the most part, upon such primary sources as school board minute and newspaper accounts, but supplemented by other published materials and interviews, indicates that from the first reorganization at McMinnville in 1914 to the most recent ones in 1957, the same developmental factors seem to have been operative in Oregon as in other states.

A part of the dissertation is devoted to a very general treatment of junior high school history in the state and shows growth and spread of the division since 1914. Information for this section was gleaned from records of the State Department of Education and is recorded in tabular and graphic form. It recognizes all schools ever designated as junior high schools by the department, showing also their organizational pattern and enrollment data.

This section of the dissertation also recounts the several problems of reorganized schools which have concerned educators since the first years of the movement and lists such as these: (1) a lack of definition of the unit, (2) an absence of specific standards, (3) inadequate or inappropriate curricular materials, and (4) a dearth of teachers specifically trained for this division. It is shown that these problems were recognized early in the school's existence and have, in fact, had attention of educators in Oregon for a number of years.

The major portion of the dissertation, however, is devoted to an accounting of a more complete study of the fortunes of the junior high schools in twenty-four districts of the state. The districts chosen for a more intense examination are said to be representative and include all those which had three-year junior high schools in 1957, or had had them at some time in previous years.

From these closer observations the writer makes several generalizations in the concluding chapter. These include:

- 1. Some of the earlier purposes given for reorganization have become obsolescent. The following reasons, once used extensively, are no longer heard:
 - a. Retention of pupils. Compulsory attendance laws have very generally nullified this as a purpose.
 - b. Economy of time. Though referred to in the earliest situations, this purpose was never really effective in Oregon.

- c. <u>Vocational training</u>. Since most students are in school beyond the junior high school grades, training for specific vocations is postponed.
- 2. Although present day advocates of the junior high school still subscribe to many of the aims held for earlier schools, methods used to attain these goals have changed. Some of the more marked différences in practices may be found in:
 - a. The extent of departmentalization. Though the practice of departmentalizing all subjects was at one time the chief distinguishing characteristic of reorganization, junior high schools in recent years have tended to be but partly departmentalized.
 - b. Provision for individual differences. Most schools attempt to provide for differing talents and abilities by "enrichment" and a limited amount of grouping.
 - c. Provision for exploration. The common practice of requiring certain exploratory type subjects in grades seven and eight and supplementing with electives in grade nine has become widespread in the state. Another exploratory device, the compulsory club program, which was very popular at one time, has had many of its activities absorbed into the curriculum.
 - d. Provision for guidance. The guidance function, which at first was only incidentally discharged, had become formalized by the 1930's. In recent years the guidance responsibility has again developed upon classroom teachers to a great degree.
- 3. Finally, it is contended that there are signs that the junior high school is achieving a measure of maturity in Oregon. Reorganizations since 1950 seem to have a different character and teachers and administrators alike seem to be making a more realistic appraisal of the task which is peculiarly theirs as educators in the junior high school.

Microfilm \$5.65; Xerox \$19.80. 442 pages.

A HISTORY OF AGRICULTURAL EDUCATION IN VIRGINIA WITH SPECIAL EMPHASIS ON THE SECONDARY SCHOOL LEVEL (PARTS I AND II)

(Publication No. 24,538)

Duncan Lyle Kinnear, Ph.D. The Ohio State University, 1952

An attempt has been made in the dissertation to tell the story of the long struggle to establish a system of agricultural education for whites in Virginia. Emphasis has been placed on the events leading up to or contributing to the development of agricultural education on the secondary school level. Limitations have been imposed throughout the study in that events and agencies, even though a part of the story of agricultural education in the state, have not been included or considered unless it could be demonstrated that these events or agencies contributed to or helped lay the foundation for agricultural education on the secondary school level.

The study is divided into two parts. Part I deals with

the agitation for, and the development of, agricultural education prior to the twentieth century.

Part II is devoted almost entirely to a consideration of the efforts to inaugurate a successful system of instruction in agriculture in the secondary schools of the state. In this connection considerable attention has been given to the congressional district agricultural high schools which did so much to prepare the way for the ready acceptance of Smith-Hughes vocational agriculture. A rather detailed presentation of the development of this Smith-Hughes program has been given.

In collecting data for the story of agricultural education, effort was made to locate all the pertinent information in the official legislative acts, reports, journals, minutes, and proceedings of the Virginia General Assembly and other official bodies in the state. The state agricultural journals contemporary with the different periods investigated were examined carefully, as were the early Virginia pamphlet collections in the Alderman Library at the University of Virginia and in the Virginia State Library in Richmond. Extensive use was made of the unpublished memoranda, letters, and other unpublished material filed in the Department of Vocational Education of the Virginia Polytechnic Institute and dealing with the development of Smith-Hughes vocational agriculture in the state since 1917.

The Blue Ridge Mountains at the beginning of the nineteenth century marked the dividing line between aristocratic, class-conscious eastern Virginia and democratic, middle-class western Virginia. As the nineteenth century unfolded, the west developed along the lines of general, diversified farming and stock raising on small to moderately large farms cultivated by the owner and his family. The east, on the other hand, continued to develop largely along the line of the plantation system, with the land being tilled by Negro slaves. As the century developed, the growing differences between the east and the west caused each section to develop highly divergent social, political, economic, and educational philosophies. These differences in turn led to a paralyzing sectionalism that entered into and interfered with all major ante bellum attempts toward internal improvements, the establishment of a state system of public education, and the establishment of a system of agricultural education.

Soil exhaustion aggravated by the one-crop agricultural system, early developed and too long retained in eastern Virginia, forced the leaders in the area to realize that steps would have to be taken to meet the situation. One of the first efforts toward amelioriation was started during the second decade of the nineteenth century through the medium of the agricultural societies. These organizations in Virginia, at first definitely aristocratic and exclusive in membership, none the less early developed programs in which the modern lines of agricultural experimentation, agricultural extension, and agricultural teaching are clearly discernible. As one means of encouraging experimentation and dissemination of agricultural information, the societies early turned to the use of agricultural fairs at which premiums were to be awarded to the persons showing the best results in certain prescribed areas of experimentation in agriculture. These fairs proved to be increasingly popular and in conjunction with the agricultural press helped to democratize and popularize the agricultural societies. The programs of experimentation, investigation, and agitation for agricultural improvement, sponsored by these societies and aided by the press, had

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on the eve of the Civil War succeeded to a remarkable degree in putting Virginia's agriculture on an increasingly prosperous and progressively scientific basis.

One of the earliest proposals for agricultural education in Virginia originated with the Albemarle Agricultural Society, which in 1822 proposed the establishment of an agricultural professorship at the University of Virginia. Nothing came of the proposal but it set off a wave of similar proposals which in one form or another kept recurring until after the Civil War. So great did the pressure for such a professorship become in the decade just before the Civil War that the Virginia State Agricultural Society embraced the plan and tried to force the university to establish a professorship of agriculture, with the Virginia State Agricultural Society retaining the right to name the professor. The university refused to establish the professorship on such terms, thereby incurring the displeasure of many of the farm leaders. Certain friends of the Virginia Military Institute took advantage of this displeasure and by use of private funds succeeded in establishing a school of agriculture in this school. Before the school had much more than succeeded in getting under way, however, the Civil War broke out and put an abrupt end to the first school of agriculture to be established in a state institution in Virginia.

Agitation for professorships at the university level did not absorb all the ante bellum energy spent in behalf of agricultural education. Numerous proposals and discussions of agricultural schools on the college, the secondary, and even the elementary level were carried in the press. The manual labor feature was prominent in all these proposals, but when tried at the Virginia Baptist Seminary, now the University of Richmond, in 1831 and at Emory and Henry College in 1836, this feature was not successful. The manual labor idea did not die with these schools, however, but remained alive in one manner or another until it was finally incorporated into the supervised home program, established as a part of the program of Smith-Hughes vocational agriculture in the twentieth century.

Virginia was particulary blessed with two unusually good agricultural periodicals published within the borders of the state. The Farmers' Register, published from 1833 to 1842 by Virginia's great agricultural leader, Edmund Ruffin, contributed greatly to agricultural improvement and worked arduously for the agricultural societies, the fairs, and agricultural education. This journal, although an invaluable source of rural Virginiana for the researcher into the period from 1833 to 1842, proved to be too scholarly and erudite for the great mass of farmers and in 1842 gave way to the more popularly conceived Southern Planter, established in 1841. This journal, which, with the exception of a short period during the Civil War, has been in continuous publication since, was a strong supporter of all ante bellum efforts toward agricultural improvement. These journals, together with other more local agricultural journals, and the newspapers of the day helped promote the agricultural societies and fairs and did yeoman's service in disseminating the slowly accumulating agricultural information of the day.

Virginia by 1800 had a rather well-developed aristocratic system of literary education in which the private school predominated. Some free schooling, consisting chiefly of a trade and the rudiments of reading, writing, and arithmetic, was provided for the orphans and the pauper children. The establishment of the Literary Fund in 1810

soon gave the state a sizeable fund with which to promote education. The western part of the state by 1816 began to demand that the fund be used to help establish a system of state free schools. This demand tended to alarm and anger the east, which at the time was paying an unusually large share of the state taxes. Instead of a system of free schools, the east first wanted a state university. The state university partly, with the influence of Jefferson's great name, won the struggle, and the University of Virginia was established. The victory was not without its price, however, for from the date of the establishment of the university until after the Civil War, the great majority of the west became its bitter foe and on the political rostrum and in legislative halls worked steadily against it. Thus when the east, faced with ruin from soil exhaustion, proposed as one remedy a professorship of agriculture at the university, the west defeated the proposal in an effort to strike at the hated university.

The two decades prior to the Civil War saw numerous conventions and memorials, strongly supported by the west, urging the establishment of a state system of education. At the same time these efforts were being made, numerous other memorials and conventions were urging the establishment of a system of agricultural education. By 1860 these conventions and memorials seemingly had merged together, and plans were being proposed which included agricultural education on the secondary school and the collegiate level as a recognized part of the state educational system. Unfortunately these proposals were also a Civil War casualty and, as far as the proposals on the secondary school level were concerned, were not revived to any noticeable extent until the first decade of the twentieth century.

Following the conclusion of the Civil War, Virginia adopted a new constitution which made a system of public free schools mandatory and at the same time granted the legislature permission to establish agricultural schools. The state public school system was put into operation in 1870, with W. H. Ruffner as Superintendent of Public Instruction. The small interest in agricultural education which had survived the Civil War, however, was absorbed in the fight that developed over the location of the landgrant college to be established out of the funds provided by the federal Morrill Act. The so-called loyal legislature of Virginia accepted the provision of the Morrill Act in 1864, but it was 1872 before Virginia finally resolved the dispute which arose among the colleges and academies of the state claiming the land-grant fund. It was at first proposed to give the fund to the Virginia Military Institute, the University of Virginia, and the Hampton Institute. Bitter opposition developed against the university in particular and the Virginia Military Institute in general as being too aristocratic and too theoretical to be of any good to the great mass of farmers needing educational help. As the dispute dragged on and on, more and more sentiment developed for the establishment of a new school separate from any existing college. This sentiment finally prevailed, and the land-grant fund was given to the Preston and Olin Institute in Montgomery County, with the proviso that the name of the institute be changed to the Virginia Agricultural and Mechanical College.

William Henry Ruffner, widely known for his work in establishing the first state public school system, took an active part in establishing the new agricultural college and in getting it organized on a technical basis. The college encountered much difficulty, however, for it pioneered in the attempt to set up a program of education in agriculture. Dissension within the faculty, together with the troubled conditions following the close of the Civil War, soon made a political football of the administration of the college and for a while threatened its very existence. One reorganization of the faculty followed another in quick succession. Finally, in 1891, some younger men with enough vision of the future and respect for the past to secure the support of the people of Virginia were given the responsibility for directing the destiny of the college. Largely through the effort of these young men the college was reorganized and put on the road to becoming a truly technical school. In 1944 the name of the college was officially made the Virginia Polytechnic Institute.

The last decade of the nineteenth and the first decade of the twentieth century saw a great awakening in Virginia. The defeatist attitude resulting from the Civil War began to give way to an attitude of optimism and hope for the future. The great rural masses began to demand better conditions and more voice in public affairs. Fortunately there were leaders available who channelled much of this new-found energy into programs for better schools. Field agents were appointed by the Southern Education Board to work in the state to arouse local initiative on behalf of education. As an outgrowth of the activities of the Southern Education Board, the Co-operative Education Association was formed in the state in 1904. One objective adopted by this board was the establishment of agricultural training in the public schools of Virginia. In May, 1905 this association launched a state-wide campaign on behalf of public education. This campaign, still referred to in Virginia as the "May campaign," was a prodigious success in arousing the state for better education. In 1906 Joseph D. Eggleston, Jr., a man of wide educational experience, was elected State Superintendent of Public Instruction. Largely through his influence the zeal aroused in the "May campaign" was translated into legislative action in behalf of better schools. Of particular interest is the so-called Mann high school act providing for the state's first publicly supported system of high schools.

Eggleston set to work at once to get agricultural education started in the newly developing high schools. He partially succeeded in 1908, when a part of the appropriations for the high schools was set aside for one agricultural school to be located in each congressional district in the state. These congressional district agricultural high schools were duly established and immediately embarked on the pioneer attempt to develop instruction in agriculture as a part of the secondary school program. With no expert supervision or special training, the workers in these schools laid the foundations and prepared the way for the later development of Smith-Hughes vocational agriculture. Clearly discernible in the program developed by these schools are the beginnings in Virginia of such activities as the 4-H Clubs, the F.F.A. organization, and the supervised home program. In some cases where boarding facilities were not available, dormitories were erected at these schools, and in several cases some experimental work in agriculture was conducted in co-operation with the Virginia Agricultural Experiment Station. The work in most of the schools, however, remained quite local in character and never was satisfactory from the standpoint of serving entirely the congressional districts in which they were located.

In addition to the agriculture taught in the congressional district schools, Virginia in 1915 required that one year of agriculture be taught in all rural high schools. In addition to this classroom instruction in agriculture, provisions were made whereby in counties with agricultural demonstration agents the students could carry on home projects under the supervision of these demonstration agents and receive school credit for the work. Neither of these two plans proved to be satisfactory in operation, and both were soon abandoned.

With the passage of the federal Smith-Hughes bill in 1917, Virginia immediately converted the congressional district agricultural schools into schools with Smith-Hughes departments of vocational agriculture. States to use the federal Smith-Hughes funds were required by the provisions of the federal Smith-Hughes Act to prepare a plan showing in some detail how the state intended to use the federal money. The Virginia state plan developed in line with this requirement proved to be quite effective in launching a sound program of agricultural instruction in the high schools. The administrative organization already in existence for the public schools was assigned the responsibility of administering the program of agricultural education, and the position of State Supervisor of Agricultural Education was created in the State Department of Education, with the incumbent to be responsible for supervising the program. Responsibility for the teacher-training program, after some tentative consideration of the University of Virginia and of the College of William and Mary by the State Board of Education, was assigned solely to the Virginia Polytechnic Institute.

The pioneers in this Smith-Hughes program was quite successful in building up a high morale and a co-operative spirit of working together for the solution of common problems in the field of instruction in vocational agriculture. Thus the problem of making the instructional program both in the classroom and on the farm more effective was attacked and solved co-operatively by the teachers and the teacher-training staff largely through the use of the farm survey and the job-analysis technique applied to vocational agriculture.

Some form of organization for boys studying agriculture has characterized agricultural education in Virginia since the inception of the work. In 1925 W. S. Newman proposed that a state-wide organization of boys enrolled in vocational agriculture be established. His proposal was enthusiastically received, and the organization was set up in 1926 as the Future Farmers of Virginia. The Virginia leaders worked for the establishment of the national organization of the Future Farmers of America, which upon its organization in 1928 adopted a constitution based essentially on the constitution prepared for the Virginia F.F.V. organization by Henry C. Groseclose. Groseclose's authorship of the Virginia F.F.A. constitution and his later work with the national F.F.V. have caused many people to conclude erroneously that he originated the idea of the F.F.V. in Virginia.

While there have been certain changes within the original organization set up to administer and supervise the Smith-Hughes program in agriculture, no radical reorganization of the administrative and supervisory provisions for Smith-Hughes vocational agriculture have taken place since the inauguration of the work and the assignment of administrative responsibility for the program to the administrative organization already set up by state law to

operate the public school system. With the expansion of the work a system of district supervision was inaugurated, with the district supervisors being responsible to the state supervisor. From time to time it was necessary to increase this supervisory staff at both the district and the state level. At the local level of administration of Smith-Hughes agriculture, the problem of scheduling the classes in agriculture in such a way that they would not interfere with the rest of the school schedule proved to be a difficult problem. The State Board of Education recognized this problem and shortly after the inauguration of the work permitted the local schools to try different combinations of time allotment for agriculture until the problem was successfully solved.

The provisions for teacher-training established at the Virginia Polytechnic Institute kept pace with the expanding program of education in vocational agriculture and developed in full co-operation with and as an integral part of the state program of vocational education in agriculture, which after a long struggle is now definitely accepted as a part of the secondary school program in Virginia.

The establishment and development of Smith-Hughes vocational agriculture in Virginia climaxed more than a century of agitation begun in the first two decades of the nineteenth century for a system of agricultural education, for by the legislative act of 1918 which accepted the provisions of the federal Smith-Hughes Act the state now had legal provisions for a complete system of education in agriculture. In 1872 she had established her Agricultural and Mechanical College; in 1888 she had established her Agricultural Experiment Station; in 1914 she had established her Agricultural Extension Division; and in 1918 she had provided for instruction in vocational agriculture in the secondary schools of the state. In each one of these instances Virginia acted in response to federal inducement in the form of financial aid; but in each instance before accepting federal aid, she had started her own program, which, while none too successful, had nonetheless helped prepare the way for the rapid growth of the federally aided program when it was established. This preparation of the way was particularly effective for the secondary school program of Smith-Hughes vocational agriculture, which, as Virginia entered the second half of the twentieth century, was well established in 215 high schools for whites enrolling 7,507 all-day pupils in eighty-nine of the one hundred counties of the state.

Microfilm \$8.35; Xerox \$28.40. 657 pages. Mic 59-930

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ORIGIN AND DEVELOPMENT OF MACHINES USED IN SCHOOL SHOPS

(L. C. Card No. Mic 58-7431)

Thomas Wayman Miller, Ed.D. University of Missouri, 1958

Supervisor: H. H. London

Purpose of Study: The purpose of this study was to trace the development, from their origins to the present, of

the power-operated wood and metal working machines used in school shops. The machines included in the study were arranged infour groups--machines for: (1) turning; (2) sawing; (3) planning, shaping, and milling; and (4) drilling, mortising, routing, grinding, and sanding.

Method of Research: Data utilized in this study were obtained from books about machines, inventions, and the industrial revolution; textbooks used in wood and machine shops; journals of scientific and trade associations; catalogs of manufacturers of wood and metal working machinery; and pictures of machines at various stages in their development.

Summary: Most of the wood and metal working machines used in school shops were invented or developed for practical use between 1775 and 1850. Many of the early improvements in these machines were of a general nature, affecting the development of all. Among these were: a small group of English tool builders laid the basis for future developments; most of the early inventions were constructed of wood, but metal was later substituted for wooden construction; machine design was burdened with architectural embellishment until about 1860 when manufacturers began to realize that a machine's form should follow its function; muscle power was the motive force for machines until well into the nineteenth century, but was later replaced by steam power and finally by the electric motor; a series of improvements in tool steels were influential in the development of all machines.

The lathe, one of the oldest machines used by man, remained a crude machine until about 1800 when Henry Maudslay developed a number of improvements in it. With the application of the slide rest, the lead screw, and an outside source of power, the lathe became an instrument of power and precision.

Machines for sawing, with the exception of hack saws, were invented by approximately 1800. Hack saws were not invented until 1894. Sawing machines were improved by such developments as: insertable teeth; the tensioning process; a method of brazing band saw joints; and metals capable of cutting other metals at high speeds.

Early planing machines, for both wood and metal, operated on the principle of reciprocating motion. Revolving cutterheads for wood planers were not used until 1828 when William Woodworth invented the single surfacer. Reciprocating motion is still employed by metal shapers and planers. Eli Whitney invented the milling machine and it was later improved by the development of the universal milling machine by Joseph Brown

Most of the machines for drilling, mortising, routing, grinding, and sanding were not developed until the nineteenth century. The grinder, however, dated from antiquity. By 1900 all these machines had been developed into essentially their present form.

Conclusions: The invention of one wood or metal working machine often influenced the development of those which followed.

The majority of wood and metal working machines were invented during a period extending from 1770 to 1850 in answer to a demand created by a number of inventions and developments in other areas of industrial activity.

One of the biggest problems in the development of

machines tools was that of the division and distribution of power within the machine.

When wood and metal working machines were first introduced for school shop use, the industrial type of machines were the only ones available.

Toward the end of the 1910-1920 decade a class of machines built with features making them especially adaptable for school use began to emerge.

Microfilm \$3.20; Xerox \$11.00. 246 pages.

PUBLIC AND PROFESSIONAL REACTIONS TO TEACHERS' STRIKES, 1918-1954

(L. C. Card No. Mic 58-5653)

Russell Curtis Oakes, Ed.D. New York University, 1958

This is a history of 115 teachers' strikes which occurred in the United States between 1917 and 1955. Although not all of these cases were scrutinized minutely, a balanced array of strikes in large cities and small towns from New England to Idaho and the deep south were reconstructed. Background, causes, aims, techniques used, difficulties encountered, gains and losses, factors which terminated them, and public and professional reactions to them were analyzed in some detail.

Around 1900, teachers in several large cities organized to improve teacher welfare. Local, state and national organizations were formed or infiltrated in the effort. In 1916, some teachers, impatient with the pace at which the N.E.A. turned to the new task, affiliated with labor and formed the A.F.T.

After World War I, both of these national organizations tackled teacher welfare with vigor. By 1946, despite growing pains experienced by the A.F.T. during the depression and after, both had helped to provide local teachers with organizational security out of which to promote concerted salary drives.

Fighting to keep pace with rising living costs after two World Wars and the Korean conflict, their local affiliates in widespread communities, echoing similar movements in labor, struck. In other cases, strikes were undertaken to protect the tenure rights of teachers, to gain community support in discipline of students, or to obtain back pay. Despite the fact that teachers generally fared well during the depression, those in a number of Pennsylvania coal communities were forced to strike for back pay and for their jobs at that time and, periodically, thereafter.

Many teachers' strikes were partially rooted in the resistance of boards of education, boards of estimate or taxation, city councils, state political forces, and undefined local political groups to requests for more money to improve salaries and other educational conditions. Politics seemed capable of temporarily thwarting distressed teachers under fiscally independent as well as fiscally dependent forms of school government. On the other hand, where teachers gained strong public and political support, strikes sometimes ended quickly or were avoided. Ethical political action seemed one course likely to help improve teachers salaries and educational conditions, and to thus avoid strikes.

The public, as it expressed its views through action,

through the press, and through law at the time of strike, seemed evenly divided on the question of the teachers' right to strike. Similarly, the press was divided. However, the portion of the press aligned against the idea was outspoken. Consequently, the remainder, in its attempt to present both sides, left the teachers with little articulate support. Although courts in Minnesota and Connecticut split on the issue, legislatures in numerous states have outlawed the teachers' strike. Does a local teachers strike threaten the sovereignty of a state? On this question, the courts remained divided.

The profession evaluated the underlying causes of teachers' strikes more circumspectly than did the public. But it, too, split over the question of the teachers' right to strike. Teachers and administrators could be found in either camp, and both the N.E.A. and the A.F.T. were divided internally over the issue despite the A.F.T.'s antistrike policy.

The medical and legal profession can, under certain conditions, strike. Nevertheless, the question remains, "Under what conditions might teachers strike ethically?" The profession has given this question too little thought. While tenure rights, improved working conditions, and better salaries resulted from strikes, not a single teachers' group struck primarily for the improvement of overall school conditions or the improvement of the curriculum.

Microfilm \$7.40; Xerox \$25.40. 584 pages.

THE HISTORICAL GROWTH AND DEVELOPMENT OF THE NORTH CAROLINA GUIDANCE MOVEMENT

(L. C. Card No. Mic 58-5962)

Louis Billy Pope, Ph.D.
The University of North Carolina, 1958

Supervisor: W. D. Perry

The purpose of this study is to trace the historical growth and development of the North Carolina guidance movement. In connection with this historical study of guidance, an attempt is made to cite certain instances of guidance practices in both white and Negro public schools of the State from 1924 through 1957.

Following an introductory chapter, Chapter II summarizes the history of guidance in the United States. The work of Frank Parsons and the first Vocation Bureau are described as are some of the other earlier attempts. It is concluded in this section that guidance has become somewhat a unified process. Vocational, educational, and personal-social guidance have become merged in a single phase of practice within the field of pupil personnel services.

It is evident that the following influences have had great effects on the development of guidance in North Carolina: (1) The National Occupation Conference; (2) United States Office of Education; (3) National Vocational Guidance Association; (4) The American Council on Education; (5) the George-Barden Act; (6) The North Carolina Vocational Guidance Association; (7) The North Carolina Education Association; (8) The North Carolina Teachers Association; (9) civic organizations; and (10) North Carolina colleges and universities.

As far as can be determined, the beginnings of the guidance program in North Carolina was an organized course in vocational guidance for teachers given at the 1924 summer session of North Carolina State College at Raleigh.

Few guidance courses and activities in the public schools were being sponsored in North Carolina before the Craven County guidance program in 1929. As far as can be determined, this county's program was the first county-wide demonstration of guidance in North Carolina.

Not much was done in guidance in North Carolina until the establishment of the Guidance Services Division of the State Department of Public Instruction in Raleigh on July 1, 1939. After this date, an increase in the number of guidance activities in the schools has taken place. For comparison, in 1939, 28.3 per cent of the schools of the State had a definite person in charge of the guidance program. For the year 1953-54, reports by 899 of the 912 operating high schools indicated that 582 or 63.6 per cent of them reported counselors.

Through the years the State Department of Guidance Services has aided the growth of guidance in the State. It has contributed by sponsoring conference programs; publishing articles, bulletins, newsletters, and other guidance materials; developing the cumulative record; providing a war-time guidance program; and other activities.

The guidance movement is continuing to grow in North Carolina. In 1957, over fifty counselors had received certification up to that time; 415 counselors were serving North Carolina with scheduled time in the junior and senior high schools; and an increased number of half-time and full-time counselors were employed.

Microfilm \$5.75; Xerox \$20.40. 452 pages.

THEORIES AND PRACTICES OF SECONDARY SCHOOL ORGANIZATION AND ADMINISTRATION IN THE REPUBLIC OF COLOMBIA

(L. C. Card No. Mic 58-718)

Hector G. Valencia-Vasquez, Ph.D. The Ohio State University, 1953

The purpose of the dissertation is to evaluate the secondary school system of the Republic of Colombia by determining what educational theories have influenced its development and what administrative practices have been produced by these theories, and to explore the possibilities of a new administrative policy in the light of modern educational trends.

The discussion has been confined to the administrative aspects of secondary education at the national, departmental (state), and municipal levels. Secondary schools are considered to be those offering training to elementary school graduates between the ages of twelve and twenty-one. The secondary schools are classified as university-preparatory, vocational, or normal. The university-preparatory schools, commonly called colegios, have a six-year course leading to the degree of bachiller, which entitles the graduate to enter the university. The vocational schools offer training in technical, commercial, agricultural, and semi-skilled trades. The normal schools prepare teachers for the urban and rural elementary schools. The unifying factors in this grouping under the term secondary

are the age-span of the students and the prerequisite of having completed the elementary grades.

The general organization of this dissertation is as follows:

Chapter I, "Introduction," sets forth the problem, defines terms, outlines the organization of the work, and gives information on sources.

Chapter II, "Contemporary Colombia--Its People and Their Institutions," is a description of the country, and the people and their institutions, with a sociological analysis of such outside influences as literacy, the economy, social status, religion, and politics.

Chapters III, IV, and V, "Historical Development of Public and Private Education," discuss the main events in the educational field during the periods of the Colony, the Early Republic, and the Modern Republic.

Chapter VI, "Present Organization and Administration of Secondary Schools," describes the current system of secondary schools with particular reference to the organization of the Ministry of Education and the departmental and municipal educational agencies. It also discusses the most common organizational and administrative practices at the local school level.

Chapter VII, "Evaluation of the Present Organization and Administration of Secondary Schools and Proposed Plan for Reorganization," considers the general principles of education, the task of the secondary school of today, and the particular role of administration, and formulates proposals for the improvement of these phases of education.

And Chapter VIII, "Conclusions and Summary of Recommendations," presents a résumé of the conclusions arrived at in this study and a recapitulation of the recommendations presented.

The composition of this work has required the consultation of many sources. The historical part represents an effort to put together facts that heretofore have been scattered in publications of different institutions, for example, the Colombian Academy of History, the Government of Venezuela, the Colombian Ministry of Education, El Consejo de la Hispanidad, and others. The author had access to some recent Colombian publications, for example, Rivas Sacconi's El Latín en Colombia, a very illuminating study of the Latin language in Colombia; Hernández de Alba's Aspectos de la Cultura en Colombia, a series of essays on the cultural development of the country; and Cabarico's Política Pedagógica de la Nación Colombiana, a brief study of the attitude towards education of the different regimes during the period of the Republic. The general historical chronology follows in the main that of Trevor Davies in The Golden Century of Spain and that of José M. Henao and Gerardo Arrubla in Historia de Colombia, the latter a recognized authoritative Colombian publication. The statistical data are mostly taken or adapted from the reports of the Ministry of Education and from the report of the Currie Mission, a group of American experts of the International Bank for Reconstruction and Development who are making a general survey of the Colombian economy.

In addition to the main sources mentioned above, the following publications were very helpful: La Practica de la Escuela Activa, by Adolphe Ferriere, professor of the J. J. Rousseau Institute in Geneva; La Escuela y la Psicología, by E. Claparede, founder of the same J. J. Rousseau Institute; La Democracia en la Teoría y en la Práctica, by Antonio García, Colombian professor of economics; Democracy in School Administration, by Koopman,

Miel, and Misner; Principles of Public School Administration, by W. G. Reeder; The Administration of the Modern Secondary School, by Edmonson, Roemer, and Bacon; and The Evaluative Criteria, prepared by the Cooperative Study of Secondary School Standards.

The Republic of Colombia is located in the northwestern part of South America and faces both the Atlantic and Pacific oceans. It is approximately 527,732 square miles in area. The Andes Mountains, which cross the country from south to north, determine the climate of Colombia. Within the territory it is possible to find all types of climate, from the streaming heat of the lowlands and river valleys to the frigid air of the paramos, where little vegetation is found. This makes it possible for the country to produce a large variety of agricultural products. Coffee and bananas are the main export products. These are transported from the interior to the northern coast along the Magdalena River, the most important waterway in the country. The Magdalena is about 2,000 miles long and navigable for almost its entire length.

Many factors have influenced the composition of the character of the Colombian people. The Spaniards brought their language, religion, and blood to the country. The Chibcha Indians, the most highly civilized group of aborigines in the Colombian territory, mixed freely with the Spaniards. The Negroes were brought to the country from Africa to work in the mines. The influence of France and the United States of America provided the ideas of freedom and government on which the nation was founded upon its separation from Spain in 1819. The Republic of Colombia occupies an important place among the Latin American nations. There are some problems which require serious consideration on the part of responsible citizens. Some of these problems manifest themselves in the appalling contrasts so prevalent in this country. A select minority is highly educated, and 50 per cent of the population is illiterate. In spite of efforts to bring about sanitary conditions, there is much suffering due to diseases and epidemics. The inability of a large percentage of Colombians to produce because of their lack of education and technical skill causes a wide gap between the upper and lower classes. The Constitution guarantees freedom of conscience, and yet active persecution of Protestants results from the union of Church and State. Finally, the provisions of the Constitution in regard to individual freedom are nullified by the state of emergency which has been enforced by the government for the last three years. All these problems constitute burning issues in the minds of thinking Colombians.

The historical development of the educational institutions in Colombia can be divided into three periods: The Colony (1492-1810), the Early Republic (1810-1840), and the Modern Republic (1840-1952). The main characteristics of the school system during each of these periods follow.

A. The Colonial Period

Secondary education began with the establishment of the Colegio Máximo by Archbishop Bartolomé Lobo Guerrero in 1604. This school, as all others during the colonial period, followed the instructions of the Council of Trent (1545-1563) in regard to curriculum and organization. The aim of all these schools was to prepare young men for the priesthood. The program of studies followed the Ratio Studiorum developed by the Jesuits. Latin grammar, theology, and philosophy were the main subjects taught. The

attempts to secularize the schools failed to produce practical results. José Celestino Mutis, a Spanish physician and scientist, introduced the teaching of the Copernican system in 1774. His influence made it possible to begin the Expedición Botánica, a scientific project aimed at discovering and studying the natural resources of the country. The Expedición was successful in accomplishing its task, but its work was interrupted by the War of Independence.

The philosophy of the secondary school was scholastic. The school was aristocratic and authoritarian. It placed strong emphasis on verbalism. The administrative staff was composed of a rector, a vice rector, a treasurer, and a collector, the last-named officer being in charge of collecting the money from the archbishop and the civil authorities to pay the expenses of the school. Although in matters of policy the rector was the supreme authority of the school, he was not free from strict supervision, for he was under the jurisdiction of the governor of the state and the archbishop of the diocese. There was a local board of education; however, the governor, the archbishop, and the rector usually made all important decisions. The schools were supported with taxes levied by the government and by the Catholic Church.

B. The Early Republic

After the complete separation of the country from Spain in 1819, Francisco de Paula Santander (1792-1840), first as vice president of The Great Colombia and later as president of the Republic of New Granada, devoted considerable time, money, and effort to the development of the public school system. Through presidential decrees and by acts of Congress he accomplished amazing results. The Constitutional Congress of Cúcuta (1821), under the leadership of Santander, decreed the establishment of elementary schools in each village with one hundred or more inhabitants, the founding of a secondary school in each province, the opening of schools for girls in each of the convents existing in the country, and the confiscation by the government of empty monasteries and convents for use as public schools. All education was placed under the control of the State.

By the end of Santander's career as a public servant he had accomplished much to promote education. He had brought a French mission to explore the natural resources of the country and to establish a museum; established Lancastrian schools in different sections of the territory, as well as four national universities and twenty-one secondary schools. He had founded the National Museum, the School of Mines, and the Naval School. In addition, he had organized the General Direction of Public Instruction and enlarged the secondary school curriculum to include physics, chemistry, modern languages, civics, history, and geography. He had ordered the teaching of philosophy from an eclectic point of view, with emphasis on utilitarianism as expounded by Jeremy Bentham, and had encouraged the founding of schools for girls and of private secondary schools. The Period of the Early Repubic can be considered as a landmark in the development of education in Colombia.

C. The Modern Republic

The modern period of the Republic is characterized by instability. Several revolutions took place which hampered the development of education. The most important events

in education were the introduction of the Pestalozzian educational theories through the German educational mission which visited the country in 1872; the signing of the Concordat between Colombia and the Vatican in 1877, by which the Roman Catholic Church was given power to conduct education according to the Roman Catholic faith and which virtually established a union of Church and State in Colombia; the passing of the Educational Law of 1903, which provided that secondary education should be divided into classical and technical; the visit of a second German educational mission in 1923, whose suggestions, however, were not put into practice until ten years later under the leadership of Agustín Nieto Caballero; and the educational renaissance which took place from 1930 to 1946 under the auspices of the regimes of the Liberal Party. The most progressive features of the present secondary school system were introduced during this time.

The present system of secondary schools includes the university-preparatory, the vocational, and the normal schools. They are all regulated by the Ministry of Education, which controls the total program of education in the country. Each department has a secretariat of education, which acts as agent of the Ministry of Education and, in addition, carries out the educational activities required by the departmental assemblies and the governor of the department. The municipalities also have an office of education. The Ministry of Education, the departmental secretariats, and the municipal offices of education have a body of inspectors in charge of supervising the educational program in the country. The Ministry of Education is composed of a number of sections through which its duties are discharged. One of these is an office in charge of secondary education.

Public education is supported by taxes levied by the government. The departments and the municipalities can open secondary schools if they are able to support them. In 1946 there were over a thousand secondary schools with a total of 63,960 students and 6,369 teachers. The percentage of the total population represented in the secondary schools was only 0.61. Most of the present secondary schools are private. These are under the control of the government and must comply with all the regulations of the Ministry of Education. The enrollment of the individual secondary schools varies from 100 to 1500. Most university-preparatory schools are located in urban areas, and most of the vocational and rural normal schools are located in rural areas. The public school system of Colombia provides for five years of elementary schooling, followed by either six years of bachillerato (universitypreparatory) or from two to seven years of technical training.

A consideration of the history and present situation of the secondary school system of Colombia seems to indicate three general conclusions: 1) Colombia has been isolated from modern educational thought in an effort to preserve cultural and religious uniformity; 2) the prevalent scholastic philosophy of education is inadequate for the present needs of the country; and 3) there is a pressing need for a revision of the educational practices especially at the secondary level in order to bring them up to date with the most recent developments in this field.

The following recommendations for improving the secondary school system and solving the most urgent problems that hamper it are submitted in the dissertation:

1. Any educational reform should begin by formulating a new philosophy of education which takes into consideration

the needs of the students, democratic principles, individual differences, and active methods of teaching.

- 2. The Ministry of Education and other educational agencies should be headed by experts in education and not by political appointees. Legislation should be passed by Congress providing that the minister of education and all educational authorities be appointed from among experienced educators, and for a period of at least two years.
- 3. The Ministry of Education should have an office for educational research in order to promote experimentation and progress in educational practice.
- 4. Legislation should be passed by Congress establishing the separation of Church and State, secularizing the public schools and establishing the system of coeducation in these schools.
- 5. For the support of the schools, Congress should pass laws raising the budget of education from 10 per cent of the total national budget to 30 per cent; the cooperation of industry in the building of vocational schools should be procured; and financial and technical assistance should be secured from the International Bank for Reconstruction and Development.
- 6. The Ministry of Education should enlist the interest of the public, the press, and the radio in the improvement of education.
- 7. To alleviate the present shortage of administrators and teachers, a year of specialization for secondary school teachers should be added to the urban normal schools now in existence in the country and the national and private universities should be encouraged to offer courses for teachers. Also, the salaries of secondary school teachers should be raised.
- 8. The local school should be given more freedom to experiment in order to allow for educational progress.
- 9. The local administrative staff should be appointed without discrimination on the basis of experience, training, ability, and honesty from among the teachers registered in the first category of the National Register of Secondary School Teachers.
- 10. An in-service training program should be considered indispensable for each local secondary school. The national inspection should consider it their duty to help the local school with the orientation and organization of this in-service program.
- 11. The administration of the local secondary school should be democratic. It is recommended that the faculty be divided according to experience and interest into five standing committees for the purpose of carrying out the different phases of the school program. These committees are: Committee on Cultural Activities, Committee on Guidance, Committee on Improvement of Teaching, Committee on Physical Education, and Committee on Public Relations. The names of these committees suggest their tasks. The principal of the school and the chairmen of the five committees should form a sixth committee—the Coordinating Committee—for the purpose of facilitating cooperation among the various committees and avoiding duplication in their work.
- 12. A new policy for promotion of students from one course to the next should be adopted. The new policy should be based on the idea of the readiness of the student as determined by his grades, his possibilities for further study, and his physical and social needs.
- 13. The trend towards incorporating the activities commonly considered extra-curricular into the curriculum should be encouraged, and faculty and students should learn

to work together in the development of the total school program.

14. A survey of the need for secondary school buildings in the nation should be made by the Ministry of Education. This study would lead to plans for replacing old buildings and locating new ones.

15. All secondary schools should aim at the improvement of their school plants and equipment. Also, a well-equipped school should be of use not only to the students but to the community in which it is located; therefore, a greater use of the school plant should be encouraged.

The author of the dissertation has this final word. The proposals offered here are not aimed at changing the secondary school system of Colombia overnight. Minor changes are possible in a rather short time, but those involving established principles and national habits need much time and patience. It is fortunate that the people of Colombia have the patience and the ingenuity to bring about the improvement of the educational theories and practices so badly needed in its school system. May they not lose courage but persist until their hopes, dreams, and efforts have come to fruition.

Microfilm \$3.60; Xerox \$12.20. 280 pages.

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JEWISH ELEMENTARY EDUCATION IN THE UNITED STATES; COLONIAL PERIOD TO 1900

(L. C. Card No. Mic 58-3030)

Benjamin Louis Yapko, Ed.D. The American University, 1958

Purpose and Scope of the Study. This study, in the form of a general survey, traces the historical development of Jewish elementary education in the United States from its earliest beginnings to the start of the twentieth Century.

Inquiry is made into the general background of Jewish settlement in the United States and the effects of subsequent Jewish migrations.

One of the primary concerns of this study is with Jewish communal and religious life and the institutions which evolved, since all of these aspects are vitally connected in Jewish education.

Attention is given to the methods of education, the subject matter and textual materials used and the nature of the teaching personnel who were employed, as well as to the types of educational institutions which evolved and the manner in which they functioned.

This study is also concerned with the different orientations within Judaism, since each of the major denominations developed an educational system peculiar to its individual ideology and philosophy.

Summary. Jewish history in the United States can best be described in terms of the three major migrations to the United States.

- 1. The Spanish-Portuguese Jews 1654
- 2. The German-Jewish Migration 1836-1881
- 3. The Eastern European Migration 1881-1920.

Each of these groups brought with them different philosophies, different customs and different institutions, reflecting their national backgrounds and cultural organizations.

At first, the Jews arrived in the United States in small numbers and communal and educational activities were limited. Jewish children received their religious education mainly in the home from their parents.

As new Jewish immigrants began to arrive and the Jewish population began to increase, synagogues were established and communal and educational activities centered about the synagogue. The synagogue from the very first assumed educational functions and provided for the religious instruction of the children of its members.

This period of Jewish educational history is marked by a shortage of qualified teaching personnel and a lack of textual materials. At the same time, the development of new ideologies resulted in curricular changes which had profound effects upon the objectives of Jewish education and the nature of the different types of schools which were founded.

Different types of Jewish schools were developed. Some of the schools were Sunday Schools, all-day schools, boarding schools and week-day afternoon schools. Each type of school, to some extent, represented the ideological orientation of the group which it served. Thus, the Jewish Sunday School, during this period, came to be associated with the Reform Jews, while the parochial, or all-day school and the week-day afternoon school was associated with the orthodox group. Some of the educational institutions had been transplanted from Western and Eastern Europe but had undergone many changes and modifications in the American environment.

During the period, however, with which this study is concerned, Jewish education was in a state of chaos. This period, however, is one of transition. It was a period of personal and group adjustment not only to a new physical and social environment, but to new ideas and movements. It was not until the first quarter of the twentieth century that attempts were begun to introduce order and organization into American Jewish life in general and in Jewish education specifically.

Microfilm \$2.60; Xerox \$9.00. 197 pages.

EDUCATION, PHYSICAL

THE IDENTIFICATION OF CERTAIN OUTDOOR ACTIVITIES TO BE INCLUDED IN A COLLEGE PHYSICAL EDUCATION PROGRAM FOR MEN

(L. C. Card No. Mic 58-7433)

Paul Cornman Ritchie, Ed.D. University of Missouri, 1958

Supervisor: Ralph K. Watkins

PURPOSE: The purpose of this study was to determine the preferred outdoor recreational activities that should be included in a college physical education service program for men.

METHOD OF RESEARCH: The survey method, involving the use of information check lists, was used to gather data on student participation, interest, and sources of learning for outdoor recreational activities, and to obtain the opinions of a selected professional jury in regard to the desirability of the activities for inclusion in a college physical education program for men.

SUMMARY:

- (1) Students in the study reported a wide range of pursuits, and varying degrees of participation in outdoor recreational activities.
- (2) Highest participation was reported in active team games, and in fishing, hunting, automobiling, picnicking, motorcycling, and swimming.
- (3) Interest expressed by the students varied greatly from one activity to another.
- (4) The sources of learning from which outdoor recreational activities were learned were chiefly non-school sources. In order of the number of activities for which they were the greatest source of learning the sources were: friends or youth groups; home; self and high school classes with the same number of activities; and college classes.
- (5) Those students who were high school athletes indicated a greater frequency of participation in the more active types of recreational activities, although interest was reported near the same level for both athletes and non-athletes in most of the activities.
- (6) The graduates of the larger sized high schools indicated greater participation in many of the activities, while interest was near the same level for graduates of the different sized high schools.
- (7) The single activity which was indicated to be most worthy of inclusion in a college physical education program for men, as indicated by student participation and interest, and by professional opinion, was swimming.

RECOMMENDATIONS: On the basis of this study, it is recommended that the following activities receive highest possible consideration for inclusion in a college physical education service program for men: 1. Swimming. 2. Badminton. 3. Golf. 4. Handball. 5. Outdoor Volleyball. 6. Softball. 7. Touch Football. 8. Tennis. 9. Tract and Field Events. 10. Fishing. 11. Horseback Riding. 12. Ice Skating. 13. Canoeing. 14. Rowing.

It is further recommended that the following activities be included in a college program for men whenever possible, but should receive secondary consideration to the primary group of activities listed above: 1. Archery.

2. Baseball. 3. Horseshoes. 4. Ice Hockey. 5. Skeet or Trap Shooting. 6. Target Shooting. 7. Hiking. 8. Overnight Camping. 9. Sailboating. 10. Skin Diving. 11. Water Skiing.

In order to meet special needs or unusual situations, it is recommended that the following activities be included in a college physical education program for men when such a special need is indicated: 1. Lawn Bowling. 2. Outdoor Shuffleboard. 3. Bicycling. 4. Hunting. 5. Outdoor Cooking.

It is recommended that colleges establish and maintain adequate facilities to meet the instructional needs in the activities of the physical education program. Facilities and equipment should be made available to those students who possess sufficient skill and ability, for participation in outdoor recreational activities during leisure time.

Microfilm \$2.85; Xerox \$9.80. 219 pages.

A STUDY OF THE ORIGIN OF RECREATION ACTIVITIES OF MALE STUDENTS AT SAN DIEGO STATE COLLEGE

(L. C. Card No. Mic 58-2012)

Frank Lester Scott, Ph.D. University of Michigan, 1957

This study was planned as an exploratory study. Although the literature abounds in studies on interests there has been little investigation into the origin of these various interests. This study therefore has concerned itself with finding out the sources which students themselves ascribed as originally motivating their own personal interests in recreational activity.

In May 1955, a questionnaire was given to 252 male students, mostly freshmen, of San Diego State College. It attempted to find:

- 1. The recreation activities in which the student had participated and enjoyed.
- 2. Factual information from the students' background that might have affected this choice of recreation activity.
- 3. The favorite recreation activities of the student including:
 - a. His age at first participation, and
 - b. his reason for original choice.

Over twenty possible factors in the origin of choice of recreation activities were covered. The findings indicated that all of the factors had some influence although there was considerable difference in degree and by area.

The results showed that the strongest influence on the students' choice was that of the home and particularly of the father. The latter's influence was noted in many activities, especially those in the area of "informal outing activities" (hunting, fishing, camping, etcetera). A difference in the students' choices was noted when the father was older, or younger than the average. The amount of education of the father also had an effect. The family income, basically father's salary influenced the type of activity chosen. In the broken home, a situation where the father is usually missing, the students consistently chose fewer activities.

The peer group, another strong factor, had the most influences on the student in the area of "social activities." This was generally the gang, although a girl friend was by far the strongest influence in choice of dancing.

The influence of family income was actually much smaller than had been expected. The number, age, and sex, of siblings seemed to be strong factors in the students' choice though the number of students in the various categories was too small for the results to be clear and sharply defined. Only two groups, Protestant and Catholic, were large enought for comparative purposes as far as religion was concerned. This study showed a much wider range of choice of activities by the Protestant group.

The students with the highest high school grades had a higher percentage choice of the "cultural activities" (art, music, reading, etcetera). Those whose homes had been in the large centers of population had a higher choice of "individual sports," "cultural activities," and "social activities." They were lower in such activities as hunting, fishing, and boating.

The effect of the school on the choice of recreation activities was rather unexpected. Relatives, peer group, and friends were a much stronger influence factor in all areas with the exception of "team sports" (football, basketball,

etcetera), in the stated opinion of the students.

Some of the findings of the study might be further substantiated by use of larger samples, by use of a less select group, and by using a more specific treatment. This study shows that the origin of recreation activities can be studied; that its influence by direction and by degree can be found. It gives a picture of the pattern of recreation choices of a select group. The study also presents a considerable amount of data to which other workers in this field may refer for substantiation or questioning of their own findings. Microfilm \$3.65; Xerox \$12.40. 284 pages.

EDUCATION, PSYCHOLOGY

MULTIVARIATE STATISTICAL ANALYSIS OF COGNITIVE AND NONCOGNITIVE FACTORS AND USE OF THE ANALYSIS IN AN ACTUARIAL-CLINICAL PREDICTION STUDY

(L. C. Card No. Mic 58-7416)

Peter C. Apostolakos, Ph.D. University of Minnesota, 1957

Co-Advisers: Palmer O. Johnson and Willis E. Dugan

The multivariate technique utilized was Mahalanobis' generalized distance function, D2. D2 was utilized to examine the differences, on eight factors, between five groups of preprofessional students. Of the eight factors, four were cognitive, i.e., psychometric, and four were noncognitive, i.e., statistically weighted items from a personal information sheet completed by the students. Four of the five groups were composed of successful students registered in prebusiness, prelaw, premedicine, and medical specialties (nursing, medical technology, occupational therapy, physical therapy) curricula, respectively. The fifth group was composed of unsuccessful students from all of the aforementioned curricula. Successful students had at least a 'C' average in their first year of college work; unsuccessful students had less than a 'C' average in their first year of college work.

Rao's multiple discriminant function approach was used to classify a cross-validation sample into the five groups. These classifications served as the statistical or actuarial predictions or classifications.

Ten counselors classified the cross-validation sample and their classifications served as the clinical or counselor predictions or classifications.

The D² values between all pairs of groups were all

significant at the .01 level with the exception of the D² value between the prelaw and prebusiness groups. The canonical reduction approach indicated that the groups were significantly differentiated in two dimensions. Rao's multiple discriminant function correctly classified 46 per cent of the cross-validation sample.

The clinical predictions were analyzed in a variety of ways to determine their validity and reliability. The analysis of the clinical predictions utilized the matching problem technique, Hoyt's analysis of variance approach to reliability, Goodman and Kruskal's measures of crossclassification, and Lubin's measures. Reliability coefficients were obtained for both single trial and classify-reclassify situations.

The counselors made more correct classifications of the entire cross-validation sample than did the multiple discriminant functions. For the unsuccessful group, however, the multiple discriminant functions made more correct classifications than did the counselors.

The methodology for the D² analysis and for the analysis of the clinical predictions or classifications was presented in some detail in a separate chapter. Intercorrelations between all factors for all groups were tabled. The basic data for the main analysis sample and the crossvalidation sample and the counselor and statistical classifications of the cross-validation sample were presented in the appendix. Microfilm \$3.85; Xerox \$13.00. 299 pages.

A STUDY OF THE STABILITY OF SCORES ON A PERSONALITY INVENTORY ADMINISTERED DURING COLLEGE ORIENTATION WEEK

(L. C. Card No. Mic 58-5990)

Edward Caldwell, Ed.D. The Florida State University, 1958

The increasing practice among colleges and universities of administering personality and adjustment inventories for screening purposes during the orientation periods is accompanied by a lack of research evidence dealing with the effectiveness of this procedure. Personality inventories are designed for the purpose of measuring typical behavior in normal situations. The effectiveness of an inventory, administered during orientation week for the purpose of identifying students in need of counseling, is questionable because orientation week is considered to be stressful and anxiety-producing. Therefore, it is possible that results collected from inventories given during this period are different from results that are obtained in a more "normal" situation.

The purpose of this study was to determine the extent that results collected during orientation week differed from results obtained on a retest six weeks later; and further, to determine factors that might be associated with differences in scores from orientation testing to retesting. The California Test of Personality was used as a representative instrument.

The procedures followed in making the study consisted of these steps: (1) Determining the stability of scores, based on results obtained from a group of entering freshmen tested during orientation week and results obtained six weeks later when they were retested; (2) Determining

the proportion of students who scored above and below a previously set cutting score on both administrations of the inventory; (3) Determining the proportion of students who migrated across the cutting score from one test to the other; and (4) Determining, through interviews, factors that might be associated with migration across the cutting score.

The stability was determined by a comparison of mean raw scores between the two sets of results and by comparing coefficients of stability obtained in this study with those obtained when both administrations are under standard conditions. The mean scores from the retest were all significantly different from those on the orientation test. All retest scores indicated improved adjustment. The coefficients of stability obtained from this study were lower than those reported for a comparable period of time under standard conditions. The proportion of students who scored under the cutting score on the original test was 16 percent as compared to 8 percent on the retest. Sixty percent of the students screened out for special counseling on the orientation test migrated across the cutting score on the retest and would not be considered for help. Two percent of those not screened out on the orientation test migrated across the cutting score upon retest and would be considered for help by counselors.

Interviews help with students who migranted across the cutting score from test to retest suggested four factors related to the changes: (1) orientation stress on the first administration, (2) a different frame of reference on the two administrations, (3) abnormal testing conditions during orientation week, and (4) different test making attitudes on the two occasions.

The conclusion was that the inventory administered during orientation week provided information, dealing with students' need for special counseling, that is somewhat different from an administration of the inventory under more normal conditions. Evidence was presented that the difference in results was associated with orientation conditions.

Microfilm \$2.00; Xerox \$4.20. 76 pages.

RELATIVE SPREAD IN MENTAL AND EDUCATIONAL LEVEL OF CHILDREN AGED NINE TO FOURTEEN YEARS

(L. C. Card No. Mic 59-309)

Anthony Ronald Catrambone, Ed.D. Temple University, 1958

This is one of a pair of studies. The other was made in Margate, New Jersey, a resort community.

The purpose of this investigation is to determine the extent of variability between mental and educational achievement, the relationship of variability to age and type of performance, and the influence of socio-economic background in mental and educational levels of children, aged nine to fourteen years.

In the present study four hundred sixty-seven boys and girls, in grades four to eight, in three schools in Camden, New Jersey, were given tests of mental maturity and educational achievement under standard conditions. For purposes of statistical treatment, the children are classified into age-groups of six months with two age-groups to each

grade. Derived standardized age scores are used to compute range of scores, the mean, standard deviation and the coefficient of variation for each age-group. These results are utilized in dealing with variability.

1999

Among the findings and conclusions the following are noteworthy:

- 1. The mean intelligence quotient of the present group is 108.9.
- 2. Comparisons of the mean achievement quotients of pupils in the higher and lower thirds, as determined by intelligence quotients, reveal that the lower groups did much better in the combined reading, arithmetic and language scores and almost as well as the brighter children in the social and related sciences.
- 3. Similarities to be observed between the two investigations are as follows: (a) there is a gradual decrease with age in the mean intelligence quotient of age-groups; (b) the mean for all measurements in terms of range of scores yields a spread of more than six years; (c) variability is not significantly different at different age levels; (d) variability, as measured by range, absolute variability and relative variability, is least in closely defined curricular materials and greatest in less well-defined subject matter; and (e) comparisons of the achievement quotients indicate that the brighter children, in both communities, are not performing as well as the duller children.
- 4. Differences to be found in the two populations are as follows: (a) the mean intelligence quotient of the group representative of the resort area is 8.4 points higher; (b) in terms of range, scores in the present study show less variability; (c) in terms of absolute variability, the spread in mental maturity and arithmetic ability is less in the companion study; and (d) measures of absolute and relative variability of the present group are of greater magnitude for reading, arithmetic and language skills.

The results of these investigations indicate that there is great variability to be found among children, aged nine to fourteen years. These findings carry implications for further research in the field.

There is a need to examine the possible causes of diversity in relation to mental capacity and educational achievement. Further study in the following areas would appear desirable: (a) variability as it exists among children; (b) the relation of achievement to grouping of children; (c) the effect of class size upon learning; (d) the restrictive influences of curriculum planning and operation; (e) the role of teacher training programs in pupil achievement; (f) testing and marking procedures; and (g) promotion policies and their effect upon pupil achievement.

Microfilm \$2.00; Xerox \$6.80. 143 pages.

AN EXPERIMENTAL STUDY OF THE SELECTED EFFECTS OF VOCATIONAL COUNSELING UPON VOCATIONALLY UNDECIDED COLLEGE FRESHMEN

(L. C. Card No. Mic 59-70)

Benjamin Cohn, Ed.D. Indiana University, 1958

Chairman: Louis G. Schmidt

The problem of evaluating the counseling process was investigated by determining whether or not there was a discernible and significant change in the selected responses or attitudes of the student after he had an opportunity to receive vocational counseling from a competent counselor.

A self-report instrument was constructed and divided into two main components: the individual's understanding of himself, and his knowledge of the world of work. This instrument was administered before and after a four-month period to three groups: the experimental group which consisted of 27 students who were undecided as to an occupational choice and who received counseling; the first control group which was made up of 27 students who were also undecided but who did not receive counseling; and the second control group which consisted of 27 students who were decided as to an occupational choice and who did not receive counseling. The presumption was made that by assessing an individual's feelings before counseling and then re-assessing these feelings after counseling, any change, when compared with individuals not receiving counseling would be of a nature to allow for an evaluation of the counseling process.

Findings:

- 1. When the undecided students were compared with the decided students, a significant difference at the 5 per cent level was found for four of the six statements of the "Personality" portion. These differences, however, were not consistent in any direction.
- 2. The undecided students had the higher mean number of occupations marked "Considered" when compared with the decided students on the occupational section of the self-report instrument.
- 3. When the counseled students were compared with the not-counseled students, a significant difference was found for two items of the "Needs" portion with the differences being due to the much higher proportion of unchanged responses for the not-counseled group.
- 4. After the experimental period a significant difference was found for the first item of the "Interest" portion indicating less interest for the counseled group and more interest for the not-counseled group.
- 5. Counseled students indicated a higher proportion of "Familiar" responses after counseling than did the not-counseled students.

Conclusions:

- 1. Individuals from this group who received vocational counseling did not change significantly in their feelings about themselves or in their knowledge about the world of work.
- 2. Students who had been counseled showed a significantly higher proportion of changed responses relative to their feelings and their need for personal satisfaction and

- security as factors important to the choice of an occupation.
- 3. The counseled group showed less interest in biological sciences after counseling while the not-counseled group increased their interests in this area.
- 4. Counseled students were familiar with a significantly higher proportion of occupations after counseling, indicating that counseling had the effect of putting the students in possession of more occupational information than they would have had without counseling.
- 5. The proportion of initially undecided students who claimed a vocational choice at the end of the experimental period was not significantly greater for those who were counseled than for those not counseled.
- 6. The self-report instrument proved to be a measure of change within or between groups rather than an index of vocational decision.
- 7. A difference existed between the decided students and the undecided students for four of the six statements of the "Personality" portion.
- 8. Students who were undecided as to a vocational choice considered significantly more occupations than did those who were vocationally decided.

Microfilm \$2.00; Xerox \$5.40. 107 pages.

ANALYSIS OF EVALUATIVE TEACHER COMMENTS AS A BASIS FOR REFERRAL TO A SCHOOL MENTAL HEALTH CLINIC

(L. C. Card No. Mic 58-7711)

David Faigenbaum, Ph.D. University of Michigan, 1958

The purpose of this exploratory study is to determine whether there are measurable differences between the evaluative comments made by teachers about children who are later referred to a Mental Health Clinic and those comments made about children who are not subsequently referred. A closely related sub-purpose is to determine what value these comments have for purposes of clinical diagnosis.

The data for this study consist of comments made by teachers over a five-year period in the records of 104 children in the Harrison Elementary School, Rochester, Michigan. The experimental groups comprise 52 children who were later referred to a Mental Health Clinic (designated as the "referred group") and 52 children who were not referred (known as the "non-referred group"). The latter group was matched with the referred group on the basis of teacher, grade, sex, race, and age (plus or minus six months).

To test the hypothesis that there are measurable differences in the evaluative records of referred and nonreferred children, the follwing four procedures were employed.

- 1) A quantitative analysis was made by comparing the means of the referred and non-referred cases on the basis of number of entries, number of comments per entry, and the length of entry for each case. This usually required a simple tally.
- 2) All comments about the 104 children were extracted in toto from their records. The investigator empirically

established five categories on the basis of content; namely, home, school, physical, social, emotional, and their subcategories. Each of the comments was rated as "favorable" or "unfavorable" by the investigator and a child psychiatrist. Based on the above, it was possible to examine by the chi-square test significant differences between the referred and non-referred group. Comparisons were made relative to the total number of comments, the number of favorable versus unfavorable comments for each of the referred and non-referred groups, and for each of the categories of comments. Differences were accepted as significant at the 5 per cent level of confidence.

3) To obtain a more qualitative measure, 225 representative statements were rated by eleven teachers on a ninepoint scale of desirability. Each comment on the rating scale was assigned a numerical value which was the median of the scale placement made by the teachers. A mean value was then computed for each statement for the referred and non-referred groups and their sub-groups. The differences between the means of the referred and non-referred groups were examined by the sign test. Differences between means were accepted as significant at the 5 per cent level of confidence.

4) The final step was to have two clinicians independently read all the comments for each referred case and from this information attempt to categorize each case into one of four problem areas. Reliability of the classification was determined by the extent of agreement between the two clinicians and between the clinicians and the staff of the Mental Health Clinic.

The results indicate that the quantitative comparisons between the referred and non-referred groups and between the four referred sub-groups and the non-referred matches based on the number of entries, the number of comments per entry, and space per entry are approximately equal. The total number of comments made about the referred groups also were not significantly greater than the number made about the non-referred groups.

In the qualitative comparisons based on clinicians' classification it was found that on the whole significantly fewer favorable comments were made about the referred than the non-referred group and more unfavorable comments were made about the referred than the non-referred group.

Further results reveal that in both the social and emotional categories significantly more favorable statements were made about the non-referred than about the referred group and significantly more unfavorable remarks were made about the referred than the non-referred group.

The results of the analysis of comments based on the Teachers' Rating Scale confirm the assumption that the difference in mean values of the comments for the referred group would be significantly lower than that for the non-referred group. In this, a qualitative comparison, it was found that the total referred group contained fewer favorable comments (as rated by the teachers) than for the total non-referred group.

Finally, results indicate that clinicians were unable reliably to classify cases into problem areas on the basis of information provided in the comments.

Two general conclusions can be drawn. 1) There are measurable differences in the comments about children who are referred as contrasted to non-referred children for this group studied. However, it appears that greater importance lies in significant differences found in the

various areas of comments (school, social, and emotional), rather than in the totals. 2) Clinicians are unable to identify a child's particular problem area based only on information in the teachers' evaluative comments.

It must be recognized that these results apply only to the groups studied, and that no formal claim should be made from this evidence that similar results hold for other populations. Microfilm \$3.00; Xerox \$10.20. 230 pages.

THE CONCEPTUAL STRUCTURE IN SPONTANEOUS CLIENT LAUGHTER DURING COUNSELING INTERVIEWS

(L. C. Card No. Mic 58-912)

Ann Kronquist Fitz-Hugh, Ph.D. University of Michigan, 1957

Maier has postulated that one of the essential characteristics of a humor response is a thought configuration which appears suddenly and brings with it a change in the meaning of its elements. To test this aspect of his theory, this suddenly-appearing thought configuration was termed a Gestalt reversal and defined in some detail in an "Instrument for Identifying Gestalt Reversals." This was then used to identify Gestalt reversals in typescripts of 18 electrically recorded counseling interviews from which all descriptions of laughter sounds had been deleted. They were then compared with client laughter responses identified in the original undisguised transcript.

The data supported the hypotheses that client responses containing laughter can be demonstrated to contain Gestalt reversals a significantly higher proportion of the time than is the case in responses that do not contain laughter. In 85 per cent of the 1,198 responses, Gestalt reversals occurred in laughter responses and did not occur in non-laughter responses.

Half of the interviews were from cases with counselor ratings of successful outcome. Each of these interviews was matched with an interview from a case with a counselor rating of unsuccessful outcome. The data from both successful and unsuccessful cases supported the hypothesis at a statistically significant level. The data tended to suggest that the slightly higher predictive accuracy obtained by applying the hypothesis in successful cases was due to the extent to which clients verbalized their thought processes rather than the production of laughter as a response to something other than humor.

Until the time when a larger proportion of laughter responses can be predicted by identifying some element in the content of the stimulus or some aspect of the subject's thought process, it is tentatively concluded that evidence has been found supporting Maier's theory about the conceptual structure of humor.

Microfilm \$2.00; Xerox \$4.00. 71 pages.

AN INQUIRY INTO THE HOUSING STATUS AND HOUSING NEEDS OF MARRIED STUDENTS AT INDIANA UNIVERSITY

(L. C. Card No. Mic 59-73)

Dan Anderson Fults, Ed.D. Indiana University, 1958

Chairman: Louis G. Schmidt

Indiana University has constituted a potential laboratory for the study of the problems and needs of married students because of the large number of married students attending the University and the extensive and varied nature of the married housing facilities operated by the University.

The purpose was to: (1) define and analysis the housing wants of married students at Indiana University, (2) determine whether or not the wants were realistic, and (3) determine if the wants were being met by the University.

In order to develop the possibilities that were presented in the general statement of the problem, it was reduced to 15 hypotheses. The controls stated in the hypotheses were: age, length of marriage, number and ages of children, income, husband's educational attainment, husband's previous occupational level, wife's occupational status, wife's educational attainment, wife's educational status, housing occupied, length of time in housing unit, University housing versus private housing, sex, realism of housing wants, and educational potential of housing wants.

Opinions were solicited from a stratified random sample of married students attending Indiana University during the second semester of the school year 1957-1958. The questionnaires were personally delivered to 249 student families living in University housing and 150 student families living in private housing. The purpose of the study was explained to the participants and an opportunity was provided to ask questions concerning the questionnaires or the study. Eighty-eight percent of the questionnaires were returned.

The hypotheses offered were tested for their ability to discriminate between groupings of the controls expressed in the hypotheses for the questionnaire items on an item by item basis. The hypotheses were converted to null hypotheses which, in turn, were tested using chi-square.

Deans of Students and Directors of Housing were interviewed to test the hypotheses concerning the realism and educational potential of the housing wants expressed by the married students.

The controls used in analyzing the data varied in efficiency to differentiate the housing wants expressed by married students. Each of the 73 facilities and practices listed in the questionnaire was extracted as differentially important by at least one of the controls used.

On the basis of the findings, the following conclusions were drawn:

- 1. Controls which were most efficient in differentiating the wants of married students included: number and ages of children, length of marriage, wife's occupational status, and wife's educational status.
- 2. Controls which were least efficient in differentiating the wants of married students included: sex, age, length of time the family had lived in their unit, and income.
- 3. The housing wants of married students living in private housing were different from the housing wants of married students living in University housing.

- 4. Married students having certain facilities felt that these facilities were more desirable than married students not having the facilities.
- 5. The most universal concern of the married student was rent.
- 6. The housing wants of married students were considered justifiable because of educational potential by Deans of Students.
- 7. Directors of Housing felt the housing wants of married students must be considered in terms of the ability of the married student or the willingness of some agency to pay the cost.
- 8. Directors of Housing considered the housing wants of married students economically justifiable.
- 9. Indiana University has improved its position in meeting the housing wants of the married student as each new housing project has been built.

The differential housing wants of married students implied that Indiana University should undertake a continuing study of the structure of the married student body, of the differential housing wants of married students living in University housing and private housing, and of current practices in the commercial housing field.

Microfilm \$2.15; Xerox \$7.60. 163 pages.

A STUDY OF ETHICAL DISCRIMINATORY ABILITIES AMONG SELECTED HIGH SCHOOL STUDENTS

(L. C. Card No. Mic 59-77)

Robert L. Jones Jr., Ed.D. Indiana University, 1958

Chairman: Robert H. Shaffer

Introduction

In the past, many efforts have been made to establish the ethical discriminatory level of various individuals and groups within our society. Such attempts have covered both juveniles and adults, but no work seems to have been done on the comparative ethical discriminatory abilities of high school disciplinary offenders and high school leaders. Because of the responsibility placed upon schools by society for the training of young people, there appeared to eixst a definite need for research in this area.

Problem

The purpose of this study was to determine if there was a measurable difference in the ability of high school students with disciplinary records and those with records of leadership to discriminate ethically between correct and incorrect actions.

Procedure

Ten problem situations based on common adolescent disciplinary infractions were prepared. In each situation, the person involved was pictured doing something wrong, but strong mitigating circumstances were included with each to show that the person in the story had what he considered valid reasons for behaving as he had. The stories

were then read in private interview situations to ninety male students at Martinsville High School. The ninety subjects were divided into groups of fifteen each. Two groups consisted of students with disciplinary records at the school, one from inside the city limits and one from outside; two groups consisted of student leaders at the school, one from inside the city limits and one from outside; and two groups consisted of students chosen at random from the student body, one group from within the city limits and one from outside. Each subject was asked to state his feelings regarding the rightness or wrongness of what the main character in each situation had done. The responses were evaluated by a panel of five disinterested judges. These same evaluations were later used to compare the subjects on the basis of economic background and home conditions.

Findings

(1) Significant differences in ethical discriminatory ability were found between the following groups: urban disciplinary and urban leadership, urban disciplinary and urban control, rural disciplinary and rural leadership, and rural disciplinary and rural control. In each case, the disciplinary groups rated lower in ethical discriminatory abilities. (2) There were no significant differences in the other comparisons made. (3) There were no significant differences between groups on the basis of economic background and home conditions, though the F value obtained for home conditions did approach significance and was in favor of the leadership groups.

Conclusions

(1) The study indicated rather definitely that individuals vary greatly in their ability to discriminate ethically between various courses of conduct. (2) Students with disciplinary records tend to come from homes rated only average or below with regard to home conditions, while students with records of leadership tend to come from homes rated as average or above with regard to home conditions. (3) Home conditions have a much greater effect on the character development of the adolescent than does economic background.

Microfilm \$2.00; Xerox \$6.00. 124 pages.

THE DEVELOPMENT AND VALIDATION OF A SCALE FOR THE MINNESOTA MULTIPHASIC PERSONALITY INVENTORY TO DIFFERENTIATE PRESIDENTS FROM NON-PRESIDENTS OF COLLEGE STUDENT ORGANIZATIONS

(L. C. Card No. Mic 58-7430)

James Winston Martin, Ed.D. University of Missouri, 1958

Supervisors: Robert Callis and Paul C. Polmantier

PROBLEM: To construct a scale for the Minnesota Multiphasic Personality Inventory which will differentiate between presidents and non-presidents in college student organizations, and to determine if the Si scale of the MMPI will differentiate between presidents and non-presidents in student organizations.

SOURCES: A sample composed of 141 junior and senior students in the University of Missouri who had been presidents of student organizations at some time in the period September 1, 1956, to June 1, 1958, made up a part of the study. A sample composed of 131 juniors and seniors in the University of Missouri who had not been president of a student organization at any time during the same period constituted the remainder of the total sample. The total sample of 272 students was drawn from an original group of 487 who were either presidents or non-presidents. Any of the members of this group who were identified as having held the office of vicepresident, secretary, treasurer or other major elective office were eliminated from the study. The only criteria for participation in the study were that a student be a president or non-president and that he be currently a junior or senior in the University.

PROCEDURES: The MMPI was administered to each of the students. Also, each person completed a personal data questionnaire. A construction group of 100 presidents and 100 non-presidents was drawn randomly from the total group. An item analysis of the MMPI responses of the construction group was performed to determine which items differentiated between presidents and non-presidents at the .05 level of confidence. The phi coefficient was used as the statistical index of significance. Sixtyseven items met the criterion of significance. The items were checked for sex bias, and two were eliminated leaving 65 items for the Si scale. The scale was scored on a validation group of 41 presidents and 31 non-presidents, and the means of the two sub-groups were tested for significance of difference by the t-test. The differences were significant at the .01 level of confidence for men, for women and for the two combined. The validation group was scored also on the Si scale and the means tested for significance of difference by the t-test. Significant differences were found for men and for men and women combined, but not for women alone. The construction group was scored on the Si scale, and the means were tested with the t-test. Significant differences were found between the sub-groups for women and men and women combined, but not for men alone. The reason for this contradiction in results on the Si scale was not determined. The presidents and non-presidents were tested for significance of difference on the variables of age, marital status, education and occupation of parents and participation in activities in high school and college. A significant difference which was consistent for both the construction and validation groups was found only for participation in college activities. These results showed that the presidents were more active in student activities.

FINDINGS: Four conclusions were drawn from the study.

(1) It was possible to construct a scale for the MMPI which will differentiate between presidents and non-presidents of college student organizations.

(2) The scale as constructed is as effective as the Si scale in differentiating between presidents and non-presidents.

(3) The scale appears to be equally effective when used with men, women or the two combined.

(4) The role of the other variables tested was not fully determined. However, the tentative conclusion is that they play a minor part in differentiating between presidents and non-presidents of college student organizations.

Microfilm \$2.00; Xerox \$5.80. 117 pages.

RELATIONSHIP OF PHYSICAL, SOCIO-ECONOMIC, AND ATTITUDINAL FACTORS TO ELEMENTARY SCHOOL TRAINING AND ACADEMIC ACHIEVEMENT OF SECONDARY PUPILS

(L. C. Card No. Mic 58-3712)

Aurora Abear Miñoza, Ph.D. University of Michigan, 1958

This study deals with group differences in academic achievement, physical size, socio-economic background and attitude toward school of two groups of high school students who were matched for intellectual ability but who had different elementary school backgrounds. One group graduated from the University Elementary School, University of Michigan (UES). The other group came from a number of elementary schools in and outside of Ann Arbor (Non-UES). The entire sample attended or are attending the University High School (UHS). This study is concerned with testing the following hypotheses: (1) there are no significant differences between the UES and the Non-UES groups in mean academic achievement, physical size, socio-economic status and attitude toward school, and (2) there are no significant relationships between academic achievement and physical measures, socio-economic status and attitudes toward school for the total sample and for the UES and Non-UES groups.

Fifty-two matched pairs were obtained: 12 pairs from the 1957 graduating class, 10 pairs from the present tenth grade, 10 pairs from the present eleventh grade, 10 pairs from the 1955 graduating class and 10 pairs from the 1956 graduating class. The following data were secured: (1) from cumulative records - reading age, spelling age, language age, arithmetic age, and educational age; physical measures of height, weight and grip strength; (2) from McGuire's Index of Value Attitudes - socio-economic index scores; (3) from ratings on the Word Rating Form - attitude scores. The significance of the difference between means of the two groups for each of the above measures was determined with the two-tail t-test. The coefficients of correlation between academic achievement and physical size, between academic achievement and socio-economic status, and between academic achievement and attitude scores were obtained to determine the extent of their relationships.

The investigation began with a longitudinal analysis of the 9th, 10th, 11th, and 12th grade achievement ages of twelve pairs of UES and Non-UES graduating seniors who were matched for intellectual ability. The pattern of differences varied from grade to grade, but they were all in favor of the UES group. Of the twenty comparisons, seven were significant at the 5% level. On the basis of this preliminary study, the sample was expanded to include fifty-two pairs as indicated above. A comparison of academic achievement for the fifty-two pairs was based on a high school achievement age. This measure was arrived at by

averaging each achievement age at successive grade levels for each pupil. In the comparison, the two groups differed significantly in the five achievement ages at the 5% level of significance or better.

Analysis of the data on physical size, scoio-economic status and attitude toward school yielded the following results: (1) no significant difference was found between mean physical measures of the UES and Non-UES groups; (2) a significant difference was obtained between mean socio-economic index scores of the two groups in favor of the UES group; (3) except for the concept "numbers," no significant difference was found between mean attitude scores of the UES and Non-UES groups; (4) no significant relationship was seen between physical measures and academic achievement of UES and Non-UES students; (5) significant relationships were obtained between socio-economic status and academic achievement of UES and Non-UES students which varied according to sex, elementary school background and academic skills; (6) no significant relationship was noted between attitude toward school and academic achievement of UES and Non-UES students.

The following conclusions are drawn from the study: (1) UES pupils achieve better in high school than Non-UES pupils of the same intellectual ability; (2) UES and Non-UES pupils do not differ in physical measures; (3) UES pupils, in general, come from a higher socio-economic status than Non-UES pupisl in the UHS; (4) UES and Non-UES pupils do not differ in their attitudes toward school; (5) physical measures of UES and Non-UES pupils are not related to academic achievement; (6) among UHS students, the relationship between socio-economic status and academic skills varies: the relationship is greatest for language, less for spelling and reading, and least with arithmetic; (7) in the UHS, the relationship between socioeconomic status and school achievement is greater for male students than for female students; (8) in the UHS, the relationship between socio-economic status and school achievement is greatest for Non-UES males and least for UES females; (9) in the UHS, student's attitudes toward school are not related to academic achievement.

Microfilm \$2.00; Xerox \$6.00. 125 pages.

A STUDY OF THE RELATIONSHIP OF FIGURE BACKGROUND DIFFICULTY AND SCHOOL ACHIEVEMENT IN CEREBRAL PALSIED CHILDREN

(L. C. Card No. Mic 59-632)

James Hamilton Neely, Ed.D. Syracuse University, 1958

A review of the literature indicated the need for relating the figure-ground aspect of visual perception and educational achievement in regard to the cerebral palsied child. The reported findings of past research indicated that brain-damaged children experience more difficulty in differentiating figure from ground than children without brain-damage. Studies in the past, however, have never compared the actual achievement of the brain-damaged child in relation to this aspect of perceptual ability. The purpose of the present study was to relate performance of

the cerebral palsied child on five different visual figureground tasks with achievement in reading and arithmetic.

Fifty-two cerebral palsied subjects in the fourth through the eighth grades comprised the experimental sample. The subjects were between 10 and 16 years of age. Intelligence quotients ranged between 80 and 135.

Four hypotheses were proposed relating figure-ground performance to achievement in reading and arithmetic. They were based on whether or not the figure-groundtasks were considered as relating to materials with which the subjects were familiar as a result of prior school experience. These hypotheses were supported by the results of the investigation. The following conclusions seem justifiable from the investigations:

- No significant relationship exists between performance on visual figure-ground tasks <u>unrelated</u> to learned experience in school and reading achievement.
- 2. No significant relationship exists between performance on visual figure-ground tasks <u>unrelated</u> to learned experience in school and arithmetic achievement.
- There is a significant relationship between performance on visual figure-ground tasks <u>related</u> to learned experiences in school and reading achievement.
- 4. There is a significant relationship between performance on visual figure-ground tasks <u>unrelated</u> to learned experiences in school and arithmetic achievement.

The results are interpreted to indicate that the educational achievement demonstrated by the present group is not directly related to difficulty in differentiating figure from ground. Except for those tasks embodying achievement materials (words), there appeared to be no significant relationship between performance on figure-ground tasks and achievement in reading and arithmetic. It was apparent that the brain-damaged children comprising the present sample were able to organize perceptual materials with which they were familiar despite the imbeddedness or mutilation of the presented stimuli.

These conclusions are restricted to populations characteristic of the present sample and to the aspects of reading and arithmetic assessed by the techniques employed. Broader interpretations must await subsequent studies utilizing more extensive populations and measures of achievement. Of particular interest would be the evaluation of figure-ground performance with younger groups on a longitudinal basis for the purpose of determining developmental patterns. Upon completion of such studies the advisability for modifying the special educational program for all or certain of the brain-injured might better be determined. Microfilm \$2.00; Xerox \$4.60. 89 pages.

A COMPARATIVE STUDY OF THE PERSONAL ADJUSTMENT OF HIGH SCHOOL STUDENTS ATTENDING A REORGANIZED RURAL SCHOOL WITH HIGH SCHOOL STUDENTS ATTENDING SELECTED RURAL TOWNSHIP SCHOOLS

(L. C. Card No. Mic 58-7989)

David Lee Rice, Ph.D. Purdue University, 1958

Major Professor: Clarence A. Pound

The purpose of this study was to compare the personal adjustment of students attending a high school in a reorganized school district which met the criteria for a satisfactory school administrative unit with the personal adjustment of students attending selected inadequate small high schools in single townships.

The student populations used in the study consisted of three hundred thirty-two students attending a reorganized school and four-hundred seventy-two students attending five single township schools located in the same county operating under similar administrative, economic, and social influences. The grade groups enrolled in the two types of schools were found not to differ significantly when compared on factors such as sex, religious preference, amount of education attained by mothers, number of high school subjects failed, or average grades earned in high school. Significant differences between the two groups were found for grades nine and ten in enrollment in various curricula, and in place of residence. The tenth grade groups were also found to differ in number of students reporting having failed one or more years in grade school. The students enrolled in grade eleven in the two types of schools differed significantly on the factors of place of residence and socio-economic status levels, while those enrolled in grade twelve differed significantly on enrollment in various curricula, and on socio-economic status levels.

The SRA Youth Inventory, Form S, was used as an estimate of the measure of personal adjustment in the study. The null hypothesis of no difference between the mean frequency scores and between the mean intensity scores for each type school for each of the eight areas of the SRA Youth Inventory, the total score, and basic difficulty items was tested by t tests at each grade level for each sex. The t tests were made with the effect of socio-economic status not partialled out, and with the effect of socio-economic status partialled out. The same groups were also compared on the rank of the eight problem area scores on frequency and intensity of items checked.

For the most part, the students attending the reorganized school did not have significantly more problems or more intense problems than did those attending the single township schools. However the tenth grade boys attending the reorganized school had significantly more problems and more intense problems than did those attending the single township schools.

Except in the groups of tenth grade boys, and in area 6 intensity scores, Boy Meets Girl, for the eleventh grade boys, the single township school groups scored significantly more problems and, or, more intense problems than did the reorganized school groups where statistically significant differences between the two groups were found.

The twelfth grade girls attending the single township schools seemed to differ more markedly than did the other groups of single township students when compared with the reorganized school students.

Problems in the area After High School were most prevalent and of most concern throughout all grades for both groups of students. Following this area rather consistently, the same general rank of second, Getting Along with Others; of fifth, About Myself; of sixth, Boy Meets Girl; of seventh, Health; and of eighth, My Home and Family, resulted in both groups when frequency of problems was compared. The reorganized school groups had a general rank of third for frequency of problems for the area My School and fourth for the area Things in General; whereas the single township school groups had a general rank of Things in General, third; and My School, fourth.

When the ranks of the intensity of area problems were considered, several shifts of one position were noted. Perhaps the shift of most interest for this study was that of the general rank of second for the area My School by the reorganized school group and third by the single township school groups, and the general rank of third for the area Getting Along with Others by the reorganized school group and second by the single township school groups.

Microfilm \$2.10; Xerox \$7.40. 157 pages.

SOME CHARACTERISTICS WHICH DIFFERENTIATE BETWEEN ACADEMICALLY SUCCESSFUL AND UNSUCCESSFUL COLLEGE BUSINESS STUDENTS

(L. C. Card No. Mic 58-7432)

Charity Conrad Risher, Ed.D. University of Missouri, 1958

Supervisor: Paul C. Polmantier

PURPOSE: The purpose of this study was to identify patterns of background, and qualities of performance on standardized measures which differentiate between academically successful and unsuccessful freshmen who enter the Business Department of East Carolina College.

METHOD OF RESEARCH: Data were secured from high school records, college records, and scores on the Freshmen Test Battery and inventories of 66 ultimately graduating and 197 non-graduating freshmen who entered college during June and September of 1951 and 1952. High school scholarship and college scholarship were correlated with the American Council on Education Psychological Examination, American Council on Education Cooperative English Test C2, Educational Testing Service Cooperative English Test A, The Bell Adjustment Inventory, and Kuder Preference Record--Vocational.

SUMMARY: Neither the size of the high school attended, nor the number of high school business subjects pursued was a differentiating factor in college success.

Percentagewise, four and one-half times as many nongraduating freshmen as ultimately graduating freshmen were on academic probation. Eighteen per cent of nongraduating freshmen were academically ineligible after one year in college. The following relationships were obtained between first year college scholarship and the college Freshmen Test Battery scores.

	Non- Graduates	Graduates
ACE Q - Scores	.27	.10
ACE L - Scores	.31	.31
ACE Total Scores	.34	.28
C2 Scores	.64	.34
Test A Scores	.45	.22

Comparisons of the Means of the ACE Q, L, Total and C2 scores showed the freshmen who ultimately graduated were significantly superior to the non-graduating freshmen. No significant difference existed between the Means of Test A scores.

In the prediction of first year college scholarship of all entering freshmen, and the four year scholarship of ultimately graduating freshmen, the inclusion of high school marks with Freshmen Test Battery scores provided a far sounder basis for estimating college scholarship than did Freshmen Test Battery scores alone.

The Bell Adjustment Inventory showed no statistically differentiated performance patterns in any area for either group of freshmen men or women.

For the freshmen men, the only statistically significant difference on the <u>Kuder Preference Record--Vocational</u> was found to be in the area of Scientific interest in favor of the non-graduating group. However, the significance was only at the five per cent level.

For the freshmen women, the only statistically significant difference on the <u>Kuder Preference Record--Vo-cational</u> was shown in the area of Clerical interest in favor of the graduating group.

CONCLUSIONS: Significant differences in the performances of ultimately graduating and non-graduating entering freshmen in the business department can be measured and identified from information available in official records. However, additional data relative to student success and mortality are needed in student personnel records at East Carolina College.

Neither the number of business courses taken in high school nor the size of the high school attended differentiates between successful and unsuccessful business students at the college.

The Bell Adjustment Inventory does not appear to be a useful instrument for differentiating between successful and unsuccessful business students at East Carolina College. Its use for that purpose is questionable.

The Clerical scale of the <u>Kuder Preference Record--</u>
<u>Vocational</u> is useful in differentiating successful from unsuccessful freshmen women business students at East Carolina College.

The Freshmen Test Battery does have positive predictive value for the success of students in the Business Department of East Carolina College, and coupled with previous high school scholarship, forms a substantial basis for prediction of probable academic success in the college.

Microfilm \$2.00; Xerox \$6.00. 121 pages.

A COMPARATIVE STUDY OF THE BROWN-CARLSEN LISTENING COMPREHENSION TEST AND THREE TESTS OF READING COMPREHENSION

(L. C. Card No. Mic 58-7623)

Ervin Rose, Ph.D. New York University, 1958

Chairman: Professor Nila B. Smith

Statement of Problem

The general purpose of this study is to investigate the relationships among the subtest skills and total test skills that are measured by standardized reading tests and a standardized listening comprehension test. The influence of intelligence upon these skills and the significance of sex differences among these abilities are also investigated.

Significance of Problem

Need for the development of research in listening is clearly indicated by the literature. It has been only within the past fifteen years that investigations into listening as a language art have been made to any extent. As a result, there is today only one listening comprehension test that has been standardized on the high school level. Other tests are being developed. Since listening skills have been determined to a large extent by reading skills, the present study is significant because it indicates whether or not the skills of reading comprehension are identical with the skills of listening comprehension.

Previous Research

Research in the literature indicates that listening is an important part of daily life and school activity. Great portions of time are devoted in classroom work to the informal development of listening skills. Even greater amounts of time are devoted in adult life to listening. There is increasing awareness that listening can be taught and should be taught within the school curriculum. However, what skills of listening should be taught and how to teach them have not been thoroughly investigated. At present, listening skills have been mainly developed from reading skills. Therefore, the literature indicates that reading and listening have factors in common which may be taught in the classroom.

Procedure in Collecting Data

A population consisting of seventy-four boys and eighty-three girls in the tenth grade was administered three standardized reading tests, one standardized listening test, and a standardized verbal intelligence test. Correlation statistics were applied to the data to determine the extent of relationships between total tests and total tests and their subtests. The factor of intelligence was partialed out of total test correlations, and the significance of sex differences was determined by use of the t-Test statistic.

Results and Conclusions

The simple coefficients of correlation between the reading and listening subtests range from .32 to .60 for boys and girls. This range does not include the rate of reading subtest which has negligible correlations with the subtests. The multiple coefficient for total test scores range from .54 to .67 for boys and girls. These drop to .16 to .36 for boys and girls when intelligence is held constant. A

combination of the three reading tests and the listening test reveal a multiple coefficient of .63 for boys and .65 for girls.

Findings of this study reveal that listening and reading, as measured by standardized tests, are not composed of closely related skills. The combination of three reading tests is more closely related to the listening test than either one reading test or a combination of any two reading tests. Inter-correlations among the subtest scores are generally of low to marked significance. Intelligence is a significant factor which seems to be inherent in the tests. The relationship between reading and listening drops significantly when intelligence is ruled out. The combination of a reading test and an intelligence test is more closely related to listening than is any other combination of tests. Rate of reading has a low or negligible relationship to any subtest skill. There are no significant sex differences between the two groups, although girls generally have higher relationships between reading and listening than boys. Reading tests measure reading to a significant degree when intelligence is nullified.

Microfilm \$2.00; Xerox \$6.00. 121 pages.

DIFFERENTIAL PREDICTION OF ACADEMIC SUCCESS FROM ACHIEVEMENT TEST SCORES

(L. C. Card No. Mic 58-5858)

Dale Paul Scannell, Ph.D. State University of Iowa, 1958

Co-Chairmen: Dr. A. N. Hieronymus and Dr. D. W. Norton

The major purposes of this study were to ascertain the usefulness of a multiple test battery in predicting general academic college success, success in courses comprising the general education program of the State University of Iowa and Iowa State College, high school academic success, and elimination from college.

A base sample was obtained of 3202 students who had taken the <u>Iowa Tests</u> of <u>Educational Development</u> as seniors in high school during the period 1948 to 1952 and who entered SUI or ISC as freshmen for the following fall term.

The following data were collected when available: results on the ITED for Grades 9 to 12; results on the Iowa Tests of Basic Skills for Grades 4, 6, and 8; high school grade-point average; high school rank in graduating class; sex; size of high school; freshman college GPA; four-year college GPA; scores on the American Council on Education Psychological Examination; GPA for courses taken in selected academic areas during the first two years of college and GPA at the time of withdrawal from college.

The results of the major correlations with freshman GPA are presented on the following page.

Predictor Variables	r*	R
Gr. 12 ITED Subtests	.609	.634
Gr. 11 ITED Subtests	.607	.637
Gr. 10 ITED Subtests	.568	.588
Gr. 9 ITED Subtests	.542	.567
Gr. 12 ITED Subtests and ACE Q & L		.648
Gr. 12 ITED C, HS GPA, HS Rank		.713

Predictor Variables	_r*	R	
Gr. 8 ITBS Subtests	.484	.490	
Gr. 6 ITBS Subtests	.494	.506	
Gr. 4 ITBS Subtests	.420	.450	

*Zero-order correlation between unweighted test composite and criterion.

The evidence indicates that the decrease in the criterion variance associated with the independent variables is not great as the time interval after testing increases.

The base sample was divided into several subsamples to study how the predictive power varied with size of high school, sex, and college attended. It was found that the differences were not significant for the size of high school, or college attended, but that predictions for females were significantly higher than for males. High school GPA consistently yielded the highest zero-order correlation with the criterion, the correlations being approximately .68.

The correlations between the ITED and four-year college GPA are presented below.

Predictor Variables	<u>r</u>	R
Gr. 12 ITED	.523	.535
Gr. 11 ITED	.537	.553
Gr. 10 ITED	.501	.512
Gr. 9 ITED	.488	.507

Combinations of the composite scores for the four years were used as predictors of both freshman and four-year GPA. The multiple correlations were found to be only slightly higher than the largest zero-order correlations with the respective criteria. The increase for freshman GPA was from .622 to .629, that for four-year GPA was from .548 to .555.

The correlations between the Grade 12 ITED subtests and GPA in selected academic areas are presented below.

Academic Areas	Sample				
	Total	SUI	ISC		
Mathematics	.480		.505		
Science	.555		.551		
English and Literature	.659				
Social Studies	.586				
Agriculture (men)			.447		
Home Economics (women)			.594		
Foreign Language		.534			

Test 3, Correctness and Appropriateness of Expression, consistently had the largest Beta weight and the highest zero-order correlation with the criterion.

The addition of the ACE scores did not increase the correlation index substantially.

The identification of unsuccessful college students from the ITED resulted in multiple biserial correlations of about .5. The accuracy of prediction was approximately the same for SUI and ISC.

The correlations of the ITBS with high school GPA were between .5 and .6. The correlations with the Grade 12 ITED composite were between .6 and .7.

Microfilm \$2.90; Xerox \$10.00. 224 pages.

A SCALE FOR DETERMINING THE ATTITUDES OF HIGH SCHOOL BUSINESS EDUCATION STUDENTS TOWARD CERTAIN ASPECTS OF OFFICE WORK

(L. C. Card No. Mic 58-697)

James LaFrance Stuart, Ph.D. The Ohio State University, 1952

The attitudes of young office workers has been and is the subject of criticisms by business employers, business educators, and personnel directors. By and large, the skill abilities of young office workers are considered satisfactory. The criticisms which are made generally refer to the non-skill, interpersonal aspects of office work.

Because of the constancy of the criticisms and because the attitudes of young office workers has had little empirical analysis, the study was undertaken with the assumption that additional insight into the problem could be gained by seeking to determine the attitudes of young office workers toward office work through an objective device. Thus, the major hypothesis tested in this study was that a scale can be constructed to determine the attitudes of business education students toward some of the non-skill aspects of office work. The following sub-hypotheses were tested:

1. The factor of sex accounts for differences in attitudes of business education students toward office work; and

2. The size of the community accounts for differences in attitudes of business education students.

A preliminary attitude scale of 101 items was constructed from the responses of 93 business education students to an incomplete sentences blank oriented toward the office situation. These items were examined by five "experts"--one sociologist, two psychologists, and two business educators.

The items on the scale were to be marked with one of the following response positions: Strongly Agree, Agree; Uncertain; Disagree or Strongly Disagree. A scale ranging from one to five for each item was assigned with a low score indicating a favorable attitude toward the item and a high score indicating an unfavorable attitude toward the item.

The preliminary scale of 101 items was given to 247 secondary business education students and their responses were subjected to the method of internal consistency analysis by which the scale was reduced to 42 items retained in the final scale on the basis of a critical ratio of 2.50 or higher.

ATTITUDES TOWARD OFFICE WORK

Age S	ex Lo	ocation of	Your School	
Father's C	ccupation		Mother's Occupat	tion
DIRECTIO	are		he statements gi	
Strongly A	-	Agree Strongly	Uncertain Disagree	Disagree
	your real	l feeling t and do no	the response white oward the statem t write your named to each statem	nent. Circle ne on the in-
Example:	It is all r	ight for a	n office	

SA A U D SD

worker to date the boss.

A accorded Thomas	Mean Score Quartile ISVD*		Critical		Mean Score Quartile ISVD*		Critical		
Accepted Items	Qua High	Low	ISVD*	Ratio	Accepted Items (cont'd)	-	Low	ISVD*	Ratio
1. Office work should be	111611	DOW.			18. The ability to make deci-	mgn	LOW		
limited to a 40 hour week.	2.50	2.02	.48	2.84	sions indicates execu- tive capacity.	3.42	2.63	.79	5.4
To be in charge of an office is the best job.	3.94	3.11	.83	4.85	19. A nine o'clock to five o'clock work schedule				
 Inexperienced workers disrupt a well-organ- 					is the most satisfactory.	1.95	1.56	.39	3.2
ized firm. 4. Union membership is good	3.29	2.53	.76	3.80	Girls usually want to wor in offices in order to				
for every employee	3.52	2.74	.78	4.02	find husbands. 21. Being relied upon causes	2.39	1.61	.78	2.9
5. The office worker should be allowed to show as					people to work harder.	3.45	2.77	.68	4.2
much initiative as he can.	3.73	2.73	1.00	5.53	 Labor unions have im- proved the lot of the office worker. 	2.21	1.55	.66	4.4
5. The qualified worker should get the job re- gardless of all other factors.	3.37	2.77	.60	3.03	23. Any legal way of getting ahead should be used by an office worker.	1.82	1.45	.37	3.2
7. Union membership should be compulsory for all office workers.	3.66	2.85	.81	4.39	24. "Playing up" to the boss is a good way to get ahead.	4.18	3.68	.50	2.6
8. A good boss should be	3.00				25. A strike is the best	4.10	3.00	.00	2.0
strict. 9. When the boss is away is a good time to ex-	2.18	1.76	.42	2.86	weapon that an office staff can use to get what is wanted.	2.52	1.92	.60	3.5
hibit your dependa- bility.	3.92	3.10	.82	3.96	26. A job in a city office gives more prestige than one in a small				
Work in a small town office is too routine.	3.73	3.10	.63	3.75	town office.	2.35	1.84	.51	3.3
1. It is easier to work for men than to work for women.	2.98	2.45	.53	2.69	27. Young workers have a hard time getting "the breaks" in an office.	3.13	2.63	.50	2.5
2. Honesty may be important but other things get you					28. People who are really trusted perform better.	3.35	2.94	.31	2.4
a raise. 3. Doing what you are told	2.87	2.31	.56	3.38	29. Young bosses treat work				
is a sure way of getting ahead.	2.68	2.15	.53	3.61	ers with more respect. 30. Starting salaries should	2.48	2.03	.45	2.8
4. Competition among office employees results in					be based on ability not on age.	3.17	2.56	.61	3.6
hurried, less accurate work.	4.21	3.73	.57	3.12	31. Too many young work- ers have to worry	4.02	3.45	.57	3.1
Office workers have more prestige than workers in the production end of					about getting fired. 32. Critical bosses are the poorest bosses.	3.22	2.71	.51	2.7
the business.	2.95	2.53	.42	2.81	33. Decision-making is		_,,_		2.,
6. The boss should decide in detail what is to be done		9 00	90	2.75	purely an executive responsibility.	3.11	2.53	.58	2.8
and how to do it. 7. Telling lies for the boss is just another part	4.26	3.88	.38	4.15	34. Organized athletic and recreation activities should be provided for				
of the job.	2.92	2.11	.81	4.47	office workers.	2.32	1.66	.66	5.

	Mean Score		Critical		Mean			Critical	
Accepted Items (cont'd)	-		ISVD*	Ratio	Rejected Items (cont'd)			ISVD*	Ratio
On most clerical jobs, the employee should be able to "take off"					9. Women bosses should not be placed over male employees.	3.13	2.88	.25	1.40
when he so desires. Elderly bosses are too	3.27	2.58	.69	4.27	10. If you work hard and no- body notices you, you				
set in their ways.	3.44	2.89	.55	3.50	should slow down a bit.		1.90	.00	.00
girls is only a tempo- rary step on the way to		4.00	44	0.70	and leads to dishonesty.		1.77	.20	1.03
A paid vacation should	4.44	4.03	.41	2.76	workers are careless and are not interested	3.27	3.13	.14	.73
office job. It costs a lot of money	3.65	3.20	.45	2.90	13. Race and religion should be factors in selecting			40:	
worker.	3.39	2.65	.74	4.35	14. Civil Service jobs do not				1.33
worker you should point out his weak- nesses to the boss.	2.15	1.56	.59	6.06	15. The little guy in an office is just as important as	1.92	1.89	.03	.1
The boss should allow the worker to do his job the way he thinks best.	4.06	3.76	.30	2.67	16. Other workers often are friendly to new em-				.4
If the company looks out for the worker then the worker should look out					17. It is a waste of time, money and effort for	2.20	2.10	.01	, 2
for the company.	3.76	3.01	.75	3.89	a labor union.	2.84	2.53	.31	1.8
Rejected Items	Qua	rtile	ISVD*	Critical Ratio	losing friends, always one should be honest.	1.55	1.31	.24	2.2
Young bosses are usually overbearing.	3.27	3.13	.14	.31	Promotions should be based on the ability displayed.	1.98	1.63	.35	2.2
Taking breaks for coffee, cokes, or recreation is a waste of company					20. It is not the concern of one employee if another loafs on the job.	2.97	2.89	.08	.3
Promotions motivate people to do better	3.42	3.16	.26	1.08	21. The office worker should be concerned about the private life of the boss.	2.13	1.92	.21	1.1
work. Being in charge is merely		1.69	.23	1.56	22. Security is not worth as much as opportunity.	2.60	2.27	.33	1.7
sibility.	2.94	2.84	.10	.43	23. All office workers should start at the bottom and work up.	2.61	2.19	.42	2.3
time to work without getting a raise.	2.79	2.48	.31	1.57	24. Other workers should help new workers to	1 50	1 44	14	1.3
worker to date the boss.		3.02	.17	1.09	25. Bosses should show	1.00	1.44	.14	1.3
A clerical job is a good stepping-stone to an executive position.	2.44	2.18	.26	1.31	an interest in and be concerned about the private lives of the				
Old employees usually make it difficult for					workers. 26. Deductions for retire-	3.53	3.18	.35	2.0
	the employee should be able to "take off" when he so desires. Elderly bosses are too set in their ways. An office job for most girls is only a temporary step on the way to getting married. A paid vacation should be part of every office job. It costs a lot of money to train a new office worker. If you dislike another worker you should point out his weaknesses to the boss. The boss should allow the worker to do his job the way he thinks best. If the company looks out for the worker then the worker should look out for the company. Rejected Items Young bosses are usually overbearing. Taking breaks for coffee, cokes, or recreation is a waste of company time. Promotions motivate people to do better work. Being in charge is merely taking on added responsibility. Six months is a long enoughtime to work without getting a raise. It is all right for an office worker to date the boss A clerical job is a good stepping-stone to an executive position.	Accepted Items (cont'd) Pua High On most clerical jobs, the employee should be able to "take off" when he so desires. Elderly bosses are too set in their ways. An office job for most girls is only a temporary step on the way to getting married. A paid vacation should be part of every office job. It costs a lot of money to train a new office worker. If you dislike another worker you should point out his weaknesses to the boss. The boss should allow the worker to do his job the way he thinks best. If the company looks out for the worker then the worker should look out for the company. A clerical job is a good stepping-stone to an executive position. 2.44	Accepted Items (cont'd) Accepted Items (cont'd) Con most clerical jobs, the employee should be able to "take off" when he so desires. Elderly bosses are too set in their ways. An office job for most girls is only a temporary step on the way to getting married. A paid vacation should be part of every office job. It costs a lot of money to train a new office worker. If you dislike another worker you should point out his weaknesses to the boss. The boss should allow the worker to do his job the way he thinks best. If the company looks out for the worker then the worker should look out for the company. A paid vacation should be part of every office job. 3.65 3.20 It costs a lot of money to train a new office worker worker you should point out his weaknesses to the boss. 2.15 1.56 The boss should allow the worker then the worker should look out for the company. 3.76 3.01 A clerical job is a long enough time to work without getting a raise. A clerical job is a good stepping-stone to an executive position. 2.44 2.18	On most clerical jobs, the employee should be able to "take off" when he so desires. An office job for most girls is only a temporary step on the way to getting married. A paid vacation should be part of every office job. It costs a lot of money to train a new office worker. If you dislike another worker you should point out his weaknesses to the boss. The boss should allow the worker to do his job the way he thinks best. If the company looks out for the worker then the worker should look out for the company. A paid vacation should be part of every office job. 3.65 3.20 4.5 4.44 4.03 4.1 4.44 4.03 4.1 4.40 5.5 6.9 6.9 6.9 6.9 6.9 6.9 6.9	Accepted Items (cont'd) Quartile High Low On most clerical jobs, the employee should be able to "take off" when he so desires. Elderly bosses are too set in their ways. An office job for most girls is only a temporary step on the way to getting married. A paid vacation should be part of every office job. It costs a lot of money to train a new office worker. If you dislike another worker you should point out his weaknesses to the boss. The boss should allow the worker to do his job the way he thinks best. If the company looks out for the worker then the worker should look out for the company. Amenda Score Quartile High Low Young bosses are usually overbearing. Taking breaks for coffee, cokes, or recreation is a waste of company time. Promotions motivate people to do better work. Being in charge is merely taking on added responsibility. Six months is a long enough time to work without getting a raise. It is all right for an office worker to date the boss. 2.44 2.18 .26 1.31	Rejected Items (cont'd) High Low Rejected Items (cont'd) Replaced over male employees. Rejected Items (cont'd) Replaced over male employees. Rejected Items (cont'd) Replaced over male employed. Replaced over male employees. Rejected Items (cont'd) Replaced over male employed. Replaced Items (cont'd) Replaced over male employed. Replaced Items (cont'd) Replaced	Accepted Rems (cont'd) Rejected Rems (cont'd) Ratio High Low	Accepted Rems (cont'd) Respected Rems (cont'd) Respected Re	Company Comp

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Rejected Items (cont'd)	Mean Score Critical 'd) Quartile ISVD* Ratio Rejected Items (cont'd)		Score		Critical				
Rejected items (contra)	High	Low	ISV D+	Ratio	Rejected Items (cont'd)	Qua:		ISVD*	Ratio
27. What you know is not as important as when you know.	3.87	3.73	.14	.76	44. If someone else is dishonest, it should be of no concern to the other workers.	3.55	3.27	.28	1.35
28. If you get what you de- serve, don't worry about anybody else.	3.40	2.95	.45	2.36	45. Unauthorized personal use of office supplies	3.55	3.41	.20	1.55
29. Busy executives are the best executives.	2.94	2.50	.44	2.43	is all right. 46. White collar workers	3.89	3.65	.24	1.68
30. A job as an only em- ployee in an office is better than one in a					hold more desirable jobs than other workers.	3.32	2.95	.37	1.98
large office. 31. When someone is relied	3.40	2.95	.45	2.36	47. A rude boss should be tolerated.	2.77	2.76	.01	.09
on, he usually ends up doing somebody else's work.	3.13	2.73	.40	2.13	48. It is better to work in a large office than it is to work in a small office.	3.40	3,03	.37	2.48
32. An office worker should be regarded suspiciousl when he takes sick leave.	y 3.98	3.71	.27	1.67	49. A worker owes it to the firm to stick to his job for at least a year.		2.84	.27	1.39
33. A person should tell lies for no one.	1.94	1.87	.07	.37	50. Personal problems shoul not be discussed during	5	0.04		0.4
34. Big business is becoming too dominant in this country.	3.06	2.95	.11	.56	working hours. 51. Women are unsatisfactor as bosses in offices.	3.98 y 3.77	3.94	.06	.31
35. An office staff produces more when the work- ers are all of the	3.71	3.37	.34	2.34	52. Office secrets should be kept by the worker as he would his own.	1.66	1.60	.06	.46
same sex. 36. A worker should expect to be paid for every					53. The office worker should correct the boss when he is wrong.	2.85	2.66	.19	1.09
thing he does. 37. A set policy on sick leave should be part	3.81	2.40	1.41	1.18	54. A worker should always work at his best rate.	1.77	1.60	.17	1.92
of every office job. 38. When no one is looking	3.16	1.81	.35	2.32	55. Smoking by women should not be allowed in an office.	3.42	3.23	.19	.87
is a good time to relax. 39. Getting ahead sometimes	4.10	3.95	.25	.98	56. A good boss should allow an office worker to sho some initiative.		1.71	.39	1.88
overshadows more important things.	2.76	2.39	.37	2.25	57. The boss should speak in manner not to be ques-	a 2.82	2.56	.26	1.35
 Young employees should not be placed over older employees. 	2.53	2,63	10	55	tioned by anybody. 58. What's good for the company is good for the		2.50	.20	1.55
41. Low-cost hospitalization plans should be included for office					employee. 59. If a worker disagrees with		2.63	.42	2.43
workers. 42. The main reason a worke	2.47 r	2.08	.39	2.16	*Item Scale Value Difference		3.52 n high		2.05 quartile
tries hard is for security.	2.84	2.50	.34	2.11	means. The criterion of internal	consist	ency w	as the p	rincipal
43. Beginning salaries for office work-		6.67		0.00	method of determining validity The selected minimum critic	employal ratio	yed in	this inve	stigation
ers are too low.	3.02	2.67	.35	2.00	at the .01 level of confidence	•			11

Reliability of the scale is indicated by the fact that a correlation coefficient of .84 was obtained by the use of the odd versus even method of calculation.

The sample of 93 students who responded to the incomplete sentences blank were college students who ranged from the sophomore to the senior levels. They were in attendance in typewriting, shorthand, and business organization classes at The Ohio State University. The sample of 247 secondary school students was obtained from 10 high schools in Ohio, and one each in North Carolina and Oklahoma. Table I summarizes the sample by number of respondents, location and sex.

TABLE I--DISTRIBUTION OF SAMPLE BY LOCATION AND SEX.

Location	Nu	mber	Total	
	Male	Female		
Columbus, Ohio	0	10	10	
Durham, North Carolina	5	23	28	
Fairborn, Ohio	15	29	44	
Greene County, Ohio	0	2	2	
London, Ohio	4	10	14	
Raymond, Ohio	0	4	4	
South Euclid, Ohio	16	13	29	
Toledo, Ohio	0	30	30	
Tulsa, Oklahoma	11	11	22	
Union County, Ohio	0	5	5	
Wooster, Ohio	13	17	30	
Zanesville, Ohio	14	15	29	
Totals	78	169	247	

Testing Sub-hypotheses.

Differences which were due to sex. Mean scores calculated for male and female respondents revealed that female mean scores were higher than male in nine of the 12 locations. The range of the mean scores of female respondents was from 259.11 to 306.10; while the mean score of male respondents ranged from 253.66 to 300.75. The narrow spread of the range of mean scores of males, and the wide spread of the range of females suggested that male respondents were more stable in their attitudes. Standard deviations were calculated to test the variability. The standard deviation of females was 20.09 as compared with 18.23 for males. Thus, it was generalized that female students are not only more unfavorable in their attitudes toward office work than are males but they are more variable.

Differences due to size of community. To test this subhypothesis, comparisons were made of the totality of the respondents from towns and cities. The locations were grouped into the following categories: Cities--Durham, North Carolina; Toledo; Tulsa, Oklahoma; and Columbus. Towns--Fairborn, London, South Euclid, Wooster and Zanesville. The mean score of city respondents was 270.66 and that of town respondents was 286.33. Standard deviations of 17.59 and 24.37 were calculated for town and city respondents, respectively. This finding suggests that while town respondents are more unfavorable in their attitudes toward office work than are city respondents, they are more stable.

The hypothesis and sub-hypotheses proposed for analysis have been found to be true within the limits of the study. No generalizations should be drawn from the findings in this study unless they are qualified by indicating

the limitations inherent in the study. Additional research employing the scale developed in this investigation and applied to various samples in other areas would help to validate or invalidate these findings as having significance beyond this particular sample.

Microfilm \$2.00; Xerox \$6.80. 144 pages.

Abstract published by special arrangement with The Ohio State University.

THE RELATIONSHIP OF SELF ACCEPTANCE TO THE CONSISTENCY OF EMPLOYMENT OF THE VOCATIONALLY REHABILITATED

(L. C. Card No. Mic 58-7435)

Vernon Thomas Thompson, Ed.D. University of Missouri, 1958

Supervisor: John F. McGowan

The problem of returning the disabled individual to a self-sufficient place in society has been increasingly emphasized in recent years. The federal government, in support of rehabilitation, has granted increased funds to the states on a matching basis to provide more and better services. This study is concerned with one of the results of rehabilitation programs.

Three main problem hypotheses were made that would pertain to the self-attitudes of disabled individuals who had received vocational rehabilitation services and had returned to work. The specific questions asked were:

- I. Does the group of disabled subjects with a consistent employment record, since having been declared rehabilitated, rate significantly higher on the variable of self acceptance than the group with inconsistent employment records following closure?
- II. Is there a significant difference on the measures of self acceptance between those congenitally and those traumatically disabled?
- III. Are those with disabilities of the external body (amputations, spasticity, deformity) less self accepting than those with disabilities where external physique is not affected (cardiac, impaired vision, loss of hearing)?

It is recognized that rehabilitation is more than a process of selecting training or restoration services. The attitudes and feelings of the disabled individual regarding his disability are major factors bearing on rehabilitation.

This study is concerned with the problem of <u>self-de-valuation</u> that has been thought to occurfollowing disability. It was felt that less self-devaluation would be found in the group of individuals who were able to maintain consistent employment following rehabilitation.

Subjects for this study were obtained from a random sample of cases closed by the Kansas City, Missouri, Office of Vocational Rehabilitation in the fiscal years 1954 and 1955. Permission to contact the subjects was granted by Missouri Vocational Rehabilitation Service with stipulations that standard research procedures be followed and identifying data would not be used. Each subject selected for the study was personally contacted and requested to

participate. Fifty-eight of the selected sample agreed to take part and an interview was arranged in which a Q-sort, Osgood's Sematic Differential Scales and a structured interview were completed. Both the Q-sort and the Osgood's Scales were completed for the way the subject felt he was and how he would most like to be. The congruence between "self-concept" and "ideal self-concept" being a measure of self-acceptance.

SUMMARY

Statistical analysis of the data by both parametric and non-parametric techniques revealed that question number one showed the only significant differences. The group of rehabilitated disabled subjects who were consistently employed measured significantly higher on the variable of self acceptance. No difference was found between those congenitally or traumatically disabled or those with external or non-external disabilities.

The findings of this study re-emphasize that for each individual adjustment is a highly personalized thing. Generalizations regarding disability types, adjustment related to nature or origin of the disability are not justified. Adjustments seem related more to the individuals perception of his situation than to external variables.

Since counseling has been noted in some studies to lead to greater self acceptance and better functioning for the individual this aspect of the rehabilitation process might be emphasized.

Microfilm \$2.00; Xerox \$5.40. 106 pages.

CHILDREN'S ATTITUDES TOWARDS TEACHERS
AND PARENTS AS DISCIPLINARIANS.

A STUDY OF TWO GROUPS OF BOYS: ONE WITH
BEHAVIOR PROBLEMS IN SCHOOL, ONE
ADJUSTED TO SCHOOL; THEIR RESPONSES TO A
TEST DESIGNED TO DETERMINE THEIR
ATTITUDES TOWARDS, AND EXPERIENCES WITH,
TEACHERS AND PARENTS AS DISCIPLINARIANS
IN SELECTED SITUATIONS

(L. C. Card No. Mic 58-5927)

Sinai M. Waxman, Ph.D. New York University, 1958

Chairman: Alice V. Keliher

The purpose of this study was to determine and compare the attitudes towards, and expected experiences with, teachers and parents as disciplinarians of two groups of eight to ten-year-old boys: (1) boys with behavior problems and (2) boys adjusted to school.

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It was hypothesized that the attitudes (children's concepts of suitable treatment) and anticipated experiences of the behavior problem group were punitive and those of the adjusted group were non-punitive. The study was also designed to test the hypothesis that the boys' attitudes did not significantly differ from their expected experiences. In addition it was hypothesized that within each group, the attitudes towards teachers did not differ from those towards parents and the anticipated experiences with teachers did not differ from those with parents.

The population consisted of sixty-eight boys drawn from the third through fifth grades of four schools in Yonkers, New York. The structure of the groups was based upon scores obtained by using the California Test of Personality, the Haggerty-Olson-Wickman Behavior Rating Schedule, and Teacher Judgment Forms. The groups were equated for the variables of chronological age, mental age, socio-economic status, and grade level. Additional criteria included these factors: living with both natural parents, English-speaking parents, child's intelligence quotient from 80 to 120, attending a public school, and birth in the United States.

The members of the groups were individually interviewed, during which time they viewed eighteen pictures and stories, designed by the investigator, depicting nine different behavior problem situations found both at school and at home. These illustrations portrayed a boy involved in destructive behavior, disobedience, careless behavior, dawdling, tardiness, stealing, unacceptable associations, conflict, and insolence. The subjects were then asked to state what they believed the disciplinarian should and would do in response to the situation.

The resulting responses were categorized in terms of their punitive or non-punitive character and the data were subjected to statistical analysis.

Based upon the population studied, the following conclusions were drawn:

- 1. In almost every situation, boys with behavior problems and those adjusted in school were of the opinion that both teachers and parents should and would be more punitive than non-punitive.
- 2. Relative to the combined situations of this study, the children of both groups asserted that teachers should and would employ more punishment than parents.
- 3. The groups' concepts of suitable discipline from teachers and parents did not differ from their expected experiences with the adults.
- 4. In general, the problem group believed that teachers and parents should and would be considerably more punitive than did the adjusted group.

Microfilm \$2.40; Xerox \$8.40. 183 pages.

EDUCATION, TEACHER TRAINING

AN ANALYSIS OF INSTRUCTIONAL PROBLEMS IN PUBLIC SCHOOL ART MET BY SELECTED GRADUATES OF NORTHERN ILLINOIS UNIVERSITY

(L. C. Card No. Mic 58-5989)

Roy O. Burke, Ed.D The Florida State University, 1958

The basis for this study is a detailed account of the personal data and job conditions of twelve graduates of Northern Illinois University with majors in art. An analysis of certain problems of these teachers in terms of the following five major art education teaching objectives is presented, with particular emphasis upon the first: developing opportunities for creative self-expression; developing personality integration and social development; developing cultural appreciation; developing perceptual, manipulative, and organizational competence; and, developing integration of art in the curriculum.

The purposes of this study were to: (1) analyze the selected teachers' major problems in relation to five commonly accepted objectives of art education, (2) analyze the material-physical environments in which the art teachers worked, (3) determine the extent to which the art program at the University prepared the teachers to meet problems related to the objectives, and (4) develop recommendations for the improvement of art education at the

University.

Data for the study were obtained from all of the 1956 and 1957 graduates with majors in art who were teaching art in Illinois, and from representative graduates of 1954 and 1955 similarly employed. A preliminary survey form and a "Viewpoints on Creativity" scale designed by the investigator were completed by the participants in the study. The selected teachers were interviewed at their schools, and each was observed teaching one or more art classes. Checklists for the physical-material environments were completed by the investigator at each school. Interviews and classroom conversations were stenographically recorded by an assistant to assure accuracy and conserve time. Supplementary data were secured from a limited study of community resources in art, University records, conversations with principals, and letters from the participating teachers.

The findings of the study showed that the selected teachers needed to be prepared to: (1) teach art at the elementary and junior high school levels as well as at the secondary school level, (2) serve as art specialists, supervisors, or auxiliary teachers, (3) identify and use community resources in art, (4) correlate art with other subjects, (5) work effectively in many art media, (6) adjust to limitations within the physical-material environments, (7) work with large classes, (8) teach as many as 1200 pupils during the school year, and (9) secure full cooperation from other school personnel in facilitating creative art activities.

It is recommended that the program for art education at Northern Illinois University should be strengthened:
(1) in the preparation of teachers of elementary and junior high school art, (2) in the early provision of direct experiences with children, (3) in the preparation of art majors to serve as supervisors and consultants in art, and (4) in the student teaching program for art education majors.

There is an apparent professional need for materials

which will facilitate the inclusion of the findings reported in the recent literature on creativity in the course work offered art education students. In public schools the pupil-teacher ratio in art should be adjusted to permit more individual assistance, the physical-material environments for art should be improved, and assistance should be given teachers and art specialists in developing common understandings of the concept of the creative child and in developing better working relationships based upon these understandings.

Microfilm \$2.85; Xerox \$9.80. 218 pages.

THE COLLEGE OF EDUCATION, UNIVERSITY OF GEORGIA, AND THE DEVELOPMENT OF TEACHER EDUCATION, 1908-1958

(L. C. Card No. Mic 58-5978)

John B. Burks, Ed.D. University of Georgia, 1958

Please see abstract on page 1986
Microfilm \$3.60; Xerox \$12.20, 277 pages.

THE UTILIZATION OF INSTRUCTIONAL RESOURCES IN TEACHER EDUCATION PROGRAMS WITH IMPLICATIONS FOR TEACHER EDUCATION IN THAILAND

(L. C. Card No. Mic 59-69)

Boonchom Chaikosi, Ed.D. Indiana University, 1958

Chairman: Hanne J. Hicks

Problem

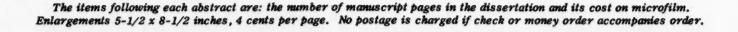
The purpose of this study was to identify and analyze the uses of instructional resources in teacher education programs in the United States with a view to appraising and adapting certain findings for possible use in the preparation of elementary teachers in Thailand.

Procedures

A review of literature concerning teacher education and instructional resources was made. This was followed by the construction of a questionnaire used for the collection of data. The inquiry involved institutions listed under "Schools for Teacher Education" in Patterson's American Education 1957-1958. Four hundred persons participated in the study. Among these, 311 were faculty members who had been recommended by the deans of schools for teacher education as persons professionally concerned with preparing teachers for the effective use of instructional resources. Eighty-nine additional participants were students of elementary education at Indiana University.

Findings

1. Resources reported by the majority of the participants as having the greatest use were basic textbooks,



professional magazines, library card catalog; bulletin and chalk boards, charts, diagrams, posters; curriculum laboratories, and school visitation.

2. The majority of the respondents reported the following as being of great importance: professional magazines, library card catalog, supplementary texts, basic selection aids, units of work, curriculum guides, basic textbooks, teachers' manuals, courses of study, tests; bulletin and chalk boards, materials used in teaching science and arithmetic, globes and maps, art materials, films, charts, diagrams, posters; curriculum laboratories, school visitation, public libraries, field trips, and resource persons.

3. Use of instructional resources was described in connection with academic courses, professional courses, and laboratory experiences. Specifically, the following were reported: study about particular resources and their uses, observation of actual uses, preparing, using, locating, and securing instructional materials and resources, building students' professional library and files, and selecting instructional resources in terms of particular purposes.

4. The majority of the participants seemed to assign great importance to most of the 14 types of experiences listed in Section IV of the questionnaire as being helpful in preparing elementary teachers for the effective use of instructional resources. The following were recommended as additional experiences to be provided: a strong background in liberal arts education, effective use of instructional resources in college classes, sufficient time for student teaching, study of children, work with children in connection with community youth agencies, courses in guidance, children's literature, and reference materials; making, administering, and use of tests and test results, and group processes.

Recommendations

1. Prospective elementary teachers in Thailand should be sensitized to the urgent need for the preparation of instructional materials with special emphasis upon using local, inexpensive resources. Such prospective teachers should also be helped to see the possibilities which community resources offer for the enrichment of learning.

2. Learning experiences concerning instructional resources should be integrated rather than being concentrated in a single course. The planning of such experiences should be cooperatively made by instructors both in liberal arts education and professional education.

3. These experiences should be provided through the following means: (1) establishment of a comprehensive library with all types of instructional materials, laboratory facilities for their use, and professionally trained librarians; (2) effective use of instructional resources in college classes; (3) special instruction in the use of instructional resources in academic courses, professional courses, and laboratory experiences.

4. Deliberate efforts should be given to the preparation of instructional materials on a large scale on the national, regional, and local bases in order to meet the urgent problem of inadequate instructional materials.

Microfilm \$5.50; Xerox \$19.40. 430 pages.

A STUDY OF THE COLLEGE GRADES, LEADERSHIP ROLES AND ENTRANCE EXAMINATION SCORES OF EMPLOYED AND NON-EMPLOYED STUDENTS AT CORTLAND STATE TEACHERS COLLEGE

(L. C. Card No. Mic 58-7212)

Franklin Earl Coolidge, Ed.D. Syracuse University, 1958

Students engaged in part-time employment during the first semester of 1955-56 were identified by a survey conducted as an official part of the registration procedure for the second semester. Only regularly enrolled students carrying the usual college load were included in the study. An employed student was defined as one who worked part-time 5 or more hours per week. These 264 employed students were compared with non-employed students selected at random in such a way that the two groups were nearly identical in numbers of students of each sex, college class year, and college division enrollment.

Comparisons were made between groups using the test to determine the statistical significance of the differences between group means in regard to:

- 1. Semester honor point average.
- 2. Total raw score on the American Council on Education Psychological Examination.
- 3. Total scaled score on the Cooperative English Test.

The employed and non-employed groups were also compared by inspection in regard to the number and percentage of students who failed to maintain a C average and the number and percentage who qualified for the dean's list by maintaining an average of B or better.

Further comparison was made in regard to the number and percentage of employed and non-employed students who were elected to office in student organizations.

Finally, comparisons were made between employed and non-employed students in regard to: (1) the correlation between the A.C.E. total raw scores and the semester honor point average, (2) the correlation between the Cooperative English Test total scaled scores and the semester honor point average, (3) the correlation between scores on these two entrance examinations, and (4) the multiple correlation between the scores on the two entrance examinations considered as independent variables and the semester honor point average considered as the dependent variable.

The findings were as follows:

- 1. A trend toward higher honor point averages for employed students, although in general the differences were not statistically significant.
- Negligible differences between the percentage of employed and non-employed students who failed to make a <u>C</u> average. The non-employed group did slightly better.
- 3. Negligible differences between the percentage of employed and non-employed students who achieved academic honors by qualifying for the dean's list. The employed group did slightly better.
- 4. The study failed to reveal either a trend or statistically significant differences between entrance score means of employed and non-employed students.

- 5. The study revealed only negligible differences between the employed and non-employed students in regard to election to office in student organizations.
- 6. With the exception of physical education women, the study failed to reveal statistically significant differences between employed and non-employed groups when first order correlations between entrance examination scores and honor point averages were compared. Among the physical education women the employed students had significantly higher correlations.
- 7. No statistically significant differences between employed and non-employed groups were found in regard to multiple correlations.
- 8. No evidence was found which would indicate that part-time employment had an adverse effect upon college grades received or upon the students' achieving recognition in student organizations by election to student office. This was true of freshmen as well as other students, refuting the usual advice that they should not seek employment during their first college year.

Conclusions and Recommendations

Students who wish to work should be encouraged to attempt it and helped to find jobs. The State of New York should establish a program of worthwhile "paid work" for ambitious students unable to win present scholarships. A study should be made of the post-college teaching success of students who were employed part-time while in college.

Microfilm \$2.00; Xerox \$7.20. 151 pages.

FACTORS OF EFFECTIVENESS IN SCIENCE
TEACHING AND THEIR APPLICATION TO THE
TEACHING OF SCIENCE IN OHIO'S
PUBLIC SECONDARY SCHOOLS
(VOLUMES I AND II)

(Publication No. 23,683)

Warren Maywood Davis, Ph.D. The Ohio State University, 1952

THE PROBLEM

The study was concerned chiefly with problems which grew out of a determination and validation of factors related to the effectiveness of a learning situation in secondary-school science, and with the application of these factors to the teaching of science in the public secondary schools of the State of Ohio. In addition, a summating study was carried forward which was concerned with the relative effectiveness or ineffectiveness of individuals in a forty-teacher sample of Ohio secondary teachers of science. These teachers were rated in over-all effectiveness, then on their apparent effectiveness with regard to those items in the factor list which were directly applicable to the teacher rather than to the teaching situation, the pupil, the school, or the physical surroundings.

FACTORS RELATED TO THE EFFECTIVENESS OF A LEARNING SITUATION IN SECONDARY SCIENCE

Factors which were believed to relate to the effectiveness of a learning situation were chosen after a survey of the literature of science education, and after a review of other literature pertaining to education in general and to secondary education in particular. Tentative lists of factors were drawn and were discussed with many individuals, all of whom had an interest in the field under study. After revision, a final list of seventeen "probable" factors was selected for distribution to individuals who held membership in any one of four educational organizations. These organizations included the National Association for Research in Science Teaching, the National Science Teachers Association, the National Association of Secondary School Principals, and the American Association of School Administrators.

The total membership of the NARST was polled because this organization represents chiefly those individuals who are interested in the preparation of science teachers. A selected list of members of the NSTA was polled because opinions of secondary science teachers were believed to be pertinent. The AASA and NASSP were included (random sampling) because the individuals who hold membership in these two organizations are often those who are placed in supervisory capacity over practicing teachers of science in the secondary schools.

While the combined judgment of the individuals polled indicated that minor revisions, in the wording of certain items were desirable, there was no item in the list which needed to be deleted or which required a major change. The changes which were suggested were, to a great extent, those which could be made by minor revisions tending to make the items more intelligible or less ambiguous.

The list of items is as follows:

- 1. Effective learning is more likely to occur when the teacher has a broad background of knowledge in the particular science he is teaching as well as in the related scientific areas.
- 2. Effective learning is more likely to occur when the teacher has a functional knowledge of how children develop and how learning takes place.
- 3. Effective learning is more likely to occur if the teacher knows about, understands, and uses a variety of methods of instruction as opposed to the exclusive use of one or two methods.
- 4. Effective learning is more likely to occur when the teacher is living the life of a normal citizen in the community, exerting community leadership appropriate to his educational position.
- 5. Effective learning is more likely to occur in our society when the teacher has a well-thought-out and consistent philosophy of teaching and when the teaching practice is consistent with the stated philosophy.
- 6. Learning will proceed more effectively when the teacher is skilled in the use of classroom aids and devices, when he is familiar with, has accumulated, and uses teaching materials of various kinds, and when he knows about and uses sources of information beyond the single textbook.

- 7. Learning will proceed more effectively when the teacher has established rapport with the learners and when the learners believe that the teacher is well informed and effective.
- 8. Learning will proceed more effectively when the major professional interest of the teacher and his major expenditure of time and energy are concerned with teaching and not with some other occupation.
- 9. Learning will proceed more effectively when there is rapport and mutual respect between the science teacher and his immediate supervisor.
- 10. Learning will be more effective if the teacher is not carrying an excessive load, either by reason of an excessive number of preparations, an excessive number of pupils per day, or an excessive extracurricular or out-of-school series of responsibilities.
- 11. Learning will be more effective in a school which has a wide variety of science offerings than in one which has a very limited number of such offerings.
- 12. More effective learning is likely to occur when the program of the school is directed toward providing for the special needs of the youth of the community than when the program is not so directed.
- 13. More effective learning is likely to occur when the program of the school is directed toward providing for the general educational needs of youth than when the program is not so directed.
- 14. Learning will proceed more effectively when the learners and the teacher sense the direction of the teaching, when both participate in the planning, and when the learners see the fulfillment of their own aims implicit in the objectives of the course.
- 15. Learning will proceed more effectively if the amount and type of laboratory equipment needed to fulfill the aims of the work is present and in operating condition, and if the number and type of aids, devices, supplies, and materials are at hand and in condition to be used.
- 16. Learning will proceed more effectively in a good physical environment than in a poor one.
- 17. Learning will be likely to be more effective when considerable attention is given to problem solving, development of critical thinking and scientific attitudes.

Naturally, all of these items apply when other factors are equal.

APPLICATION OF THE FACTORS

The application of the seventeen factors to science teaching in the public secondary schools of Ohio was made by means of data obtained from the Ohio Department of Education, from the teachers themselves, and from principals, superintendents, high school students, and school patrons. Some evidence was obtained bearing on each of the seventeen factors of effectiveness.

Data which related to the formal educational training of all of Ohio's secondary-school science teachers for the school year 1950-51 were obtained by examination of the principals' reports filed in the State Department of Educa-

tion. These records also furnished information relative to the teaching load in terms of numbers of preparations, experience in terms of number of years taught, date and type of most recent degree, major and minor areas of teaching, and the frequencies with which the science subjects were taught in the various high schools of the state. Further records made available by officials of the State Department gave information pertaining to the adequacy of the science equipment in the various schools of the state, as well as the prevalence of certain items of standard equipment in the science rooms of the state. General estimates were obtained concerning the over-all effectiveness of the science room and its attendant equipment.

Data were obtained from the teachers themselves by means of questionnaires sent to every teacher of secondary-school science subjects in the public schools of Ohio. These questionnaires yielded information which was related to the personal qualities of the teacher, including his formal and informal preparation for teaching, his experience in non-teaching fields which were related to the teaching of science, his hobbies, his science-related reading, his memberships in science or science-education organizations, his position in church and community affairs, his beliefs concerning his place in the community, and his teaching load. Also included were questions which were related to teaching method, physical equipment, and use of materials, apparatus, and supplies. Questions were asked concerning adequacy of the laboratory and science room which paralleled those asked in the reports submitted by the State Department of Education.

In a "forty-teacher study" information concerning effectiveness of teaching was obtained by use of informal visits to various schools and by contact with principals, superintendents, teachers, high-school students, parents, and townspeople. Some use was made of a pupil-rating device. This study furnished information concerning over-all effectiveness and effectiveness in each of a number of factors. It sufficed further to point out that the summation of a teacher's effectiveness may be greater than the average of his effectiveness as judged by reference to a series of factors. Particular strengths appeared to overshadow and negate some weaknesses.

THE FINDINGS OF THE STUDY

Among the 120 separate findings of this study were many which have considerable importance in their application to the factors of effectiveness. Among these are the following:

- 1. Men outnumber women teachers in science in Ohio by the ratio of approximately six to one.
- 2. City teachers, while less recently trained than rural teachers, were much more likely to have had sufficient training to claim at least a Master's degree. Almost one-third of the teachers held the Master's degree. Approximately one per cent had no degree.
- 3. Less than two of every three teachers in the county school systems had as much as two years' teaching experience.
- 4. In the county schools, eighty-five teachers of 1470 were teaching science with no college science background. Quite a number of city teachers, had little or no preparation, with 43 of 864 presenting no

- post-secondary science credit. In the state as a whole, one teacher in every fourteen either presented no science credit or presented none in his major area of teaching.
- 5. Almost one-fourth of Ohio's teachers of science (in addition to those who presented no science) offered science preparation in only one area of the sciences.
- 6. Approximately one teacher of general science in every three offered no work in any physical science. The incidence of earth sciences in the background of general science teachers was little better than zero.
- 7. While science rooms were very likely to be unsatisfactory or at least no better than "adequate" throughout the state, the incidence of poor, unsatisfactory, and non-existent science facilities was very high among the smaller county schools.
- 8. Teachers of science in Ohio's county schools were required to teach a very wide variety of subjects. Some of them had as many as seven separate preparations per day; however, the median number in the county schools was four. In the smallest county schools, over sixty per cent of the teachers had five or more preparations per day.
- Almost one in ten of Ohio's smallest county high schools offered one science only. The number of science offerings increased with the pupil population of the schools.
- 10. There was little evidence of separate courses being offered because of peculiar needs of the community.
- 11. Most teachers of science in Ohio have had significant work experience outside the classroom.
- 12. Membership in science or science-educational organizations was reported by only a small minority of the science teachers of Ohio. The city teachers were far ahead of the county teachers in this respect as they were in the matter of professional reading.
- 13. Science teachers as a whole were making outstanding contributions to the community and church life of their respective communities, according to returns from the questionnaires. Almost half of them were church leaders, over half participated in outof-school youth activities, approximately two-thirds were members of local civic, fraternal, or service groups, and about forty per cent had recently participated in community drives of one type or another. More than three-fourths of the teachers believed that the teachers in their communities commonly took part in moves for civic good, and more than four of every five believed that their communities permitted them to lead a normal life.
- 14. Coaching athletic sports was one of the most importion extra-curricular activities of science teachers, particularly in the smaller schools.
- 15. The median work load of science teachers in Ohio was as follows: Pupil load, 101-125 pupils; study-hall load, one per day; class load, five per day; preparation load, two per day in the city schools, four per day in the county schools; extra-curricular load, one major extra-curricular duty.

- 16. About half of Ohio's science teachers did extracontractual work for pay during the school year. One in five reported more than 11 hours per week of such work.
- 17. Ohio's Science teachers used films much more frequently than most other common audio-visual aids. Filmstrips were not used to nearly so great an extent. Few teachers reported use of transcriptions and recordings. Numbers and percentages of teachers using other types of aids and devices varied considerably, but in general, the city teachers reported much greater use of these aids than did the rural teachers.
- 18. About 85 per cent of the city teachers and 70 per cent of the county teachers reported that they felt thoroughly competent in their science rooms. About 13 per cent of the city teachers and 29 per cent of the county teachers said they felt partially competent, while somewhat less than two per cent in each case indicated that they felt totally incompetent.
- 19. Most of Ohio's science teachers were one-textbook teachers.
- 20. Approximately half of the science teachers indicated that the students helped them somewhat in the planning of the work of the course.
- 21. Expenditures for science purposes in the schools of Ohio were reported as being quite low generally although there were a number of outstanding exceptions.
- 22. Not more than half of the teachers responding to the questionnaire indicated that they had any very deep grasp of or insight into any philosophy of science teaching.
- 23. There seems to be a very considerable degree of relationship between "factor effectiveness" of a teacher and over-all effectiveness of the same teacher.

RECOMMENDATIONS

The following recommendations were an outgrowth of the study and were discussed in detail:

- 1. Recommendation was made for further study of pupil-teacher rapport, of philosophies of science teachers, of the place of the science teacher in the community, and of the teaching load. Need was seen also for study of the programs for science education currently being offered by the teacher-preparatory institutions and for development and study with regard to in-service education for science teachers. The position of the science teacher with respect to the core curriculum needs to be surveyed.
- 2. Need was seen for improved programs leading to teacher certification. Such programs should include deeper and broader subject-matter preparation, greater attention to the areas of child growth and development, the development of a broad general education, attention to the development of community attitudes, adequate and functional professional preparation, cultural contacts, and work directed toward

- showing the teacher his place as a leader in the community.
- Need was seen for the development of adequate inservice programs of education for those who are not competent teachers and who nevertheless are in the profession.
- 4. Recommendation was made that the science and science-education associations redouble their efforts to make teachers acquainted with their offerings.
- 5. Recommendation was made that Boards of Education in Ohio endeavor to select teachers of science in an intelligent manner, rather than selecting an individual because of his coaching (or other) ability.
- 6. Boards of Education in Ohio are urged to increase radically their budgets for science equipment and supplies. Because of the long neglect of science rooms, it is urged that this spending be placed on an emergency basis.
- 7. In order that effective programs of science teaching be developed in the rural areas, it is recommended that the State Department of Education continue with its program of consolidating schools which are so small that adequate curriculums cannot be supported.

CONCLUSION

Although science education in Ohio appeared to be suffering from a number of ills at the time of this study, careful attention to its areas of weakness can result in a much improved program in a relatively short time. There were evidences of improvement over conditions found by earlier investigators. Improvement should continue.

Microfilm \$9.80; Xerox \$34.80. 773 pages. Mic 59-931.

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A FOLLOW-UP STUDY OF A SELECTED GROUP OF BALL STATE TEACHERS COLLEGE GRADUATES

(L. C. Card No. Mic 59-72)

Franklin G. Fitch, Ed.D. Indiana University, 1958

Chairman: Howard T. Batchelder

The problem of this study consisted of two aspects of which the first was concerned with the persistence of the difficulties encountered by beginning teachers. This aspect involved a comparison of the difficulties reported by a selected group of 38 experienced teachers in 1958 with the difficulties they reported as beginning teachers in 1951.

The second aspect of the problem was concerned with a partial appraisal of selected aspects of the teacher education program at Ball State Teachers College. This involved an analysis of the comments made by the selected group of teachers in 1951 and in 1958 regarding certain aspects of the teacher education program. In addition, the appraisal of the teacher education program was based on the ability of these teachers to resolve or adjust to the

difficulties they encountered, and on evaluations of the effectiveness of these teachers by the principals under whom they were teaching in 1951 and the principals under whom they were teaching in 1958.

The teachers included in this investigation were selected from those who returned the questionnaires of an annual follow-up study conducted at Ball State Teachers College in 1951. The subjects selected were classroom teachers in the public school from 1950-1951 through 1957-1958. A total of 38 teachers, including eight women and 30 men, were included in the investigation.

Data were obtained from questionnaires returned by 38 teachers and their principals in 1951 and 1958. The persistence of difficulties was determined by comparing the difficulties reported by teachers in their first and eighth year of teaching experience. The partial appraisal of the teacher education program was based on the ability of these teachers to resolve or adjust satisfactorily to the difficulties they encountered, their comments regarding selected aspects of the undergraduate program, and the principals' evaluations of the effectiveness of these teachers.

There were significant decreases in the per cent of difficulties reported in 1958 compared to 1951 which were related to such problems as adjusting to the age level of students, personal characteristics and background of the teachers, establishing rapport with students, and developing desirable habits and attitudes of students. Difficulties related to size and number of classes and instructional activities increased significantly. Individual teachers did not report the same difficulties in 1951 and 1958. The teachers' comments regarding the selected aspects of the teacher education program were generally favorable; however, it was felt that courses in general education and psychology and preparation for handling problems in discipline could have been improved with the inclusion of more practical experiences in these phases of the program. In general these teachers were considered by their principals to be successful.

The difficulties encountered by these teachers were persistent in number but not in kind. Difficulties related to personal characteristics and background of the teachers were more readily resolved than those related to instructional activities, size and number of classes, adjusting to the age of and establishing rapport with students, and developing desirable habits and attitudes of students. In general, these teachers relied upon their own initiative in solving the difficulties they encountered, although fellow teachers and principals were also frequently called upon for assistance. In general, the undergraduate teacher education program at Ball State Teachers College was effective in most respects in preparing these teachers to do the work they were called upon to do.

A STUDY OF UNDERGRADUATE PROFESSIONAL EDUCATION AT MEMPHIS STATE UNIVERSITY

(L. C. Card No. Mic 58-7598)

Albert Ford Haynes, Ed.D. The University of Tennessee, 1958

Major Professor: Earl M. Ramer

The Problem

The purpose of this study was to evaluate certain objectives of the professional education program at Memphis State University, the problem of the study being to secure evidences through which the evaluation might be made. Sub-problems were as follows: (1) to determine the objectives sought by the program; (2) to make an analysis of the problems of selected graduates in relation to the objectives; (3) to secure a program appraisal from these graduates; (4) to analyze the appraisals of the graduates; and (5) to use the resulting analysis to suggest implications for program improvements.

Procedures

1. The criteria used in program evaluation consisted of the objectives stated in terms of competencies related to successful teaching. The objectives became the guides for subsequent steps in the study and in this sense comprised the hypotheses tested.

2. Interview guides were designed for use with beginning-teacher graduates of the program, and their principals and supervisors as follows: (1) a questionnaire containing items of personal history data; (2) an interview outline which focused on the competencies defined for the professional education program of Memphis State University; and (3) a questionnaire to secure beginning teachers' appraisal of the Memphis State University program.

3. Participants were limited to 1957 graduates of Memphis State University who were teaching in West Tennessee.

4. Interviews were conducted with each of the 38 beginning teachers, 30 principals, and 7 supervisors.

5. Classroom teaching practices of the graduates were

6. Data from interview and classroom observation were analyzed and interpreted.

Major Findings

1. Problems identified in personal and professional adjustment were predominately with pupils and parents and to a lesser degree with other teachers and principals.

2. Maintaining discipline, and understanding and planning with pupils were the most serious classroom problems.

3. Beyond the classroom, problems involved in keeping records and making reports seemed most serious. Directing extra-curricular activities and counseling students were considered less serious in nature.

4. Data failed to yield any evidence that community adjustment seemed a matter of concern for beginning teachers.

5. Program strengths identified by graduates included student teaching, student advisement, and the provision of a good general foundation for teaching. 6. Outstanding weaknesses identified included: some irrelevant content; insufficient student teaching; not enough opportunity provided for observation of children and classroom activities; too little opportunity for contact with the student-teaching coordinator; and, not enough help in the areas of evaluation, grade reporting, working with parents, planning with students, and in the use of various kinds of standardized tests.

Implications for the School of Education

- 1. There is the need to redefine professional education objectives in more functional and operational terms.
- 2. More opportunity should be provided for prospective teachers to test theory in practical situations.
- 3. More emphasis should be placed on specific and practical ways of working with children.
- 4. Prospective teachers should be oriented more fully to all aspects of the teaching profession, including human growth and development, guidance and counseling and school-community relations.
- 5. Methods courses and student teaching should be more of a genuine "real-life" experience rather than a contrived, artificial, or formal one.
- 6. The program should further stress content as well as method so that students may be more familiar with subject matter.
- 7. There is the need for intensive staff effort to improve personal, educational, and vocational guidance services to students.

Microfilm \$2.20; Xerox \$7.80. 166 pages.

A STUDY OF SELECTED CHARACTERISTICS OF THE MALE GRADUATES AND SCHOLASTIC DROP-OUTS OF THE 1951 FRESHMAN CLASS ENTERING STATE UNIVERSITY OF NEW YORK TEACHERS COLLEGE AT CORTLAND

(L. C. Card No. Mic 58-7230)

Stanley Miles Metzger, Ed.D. Syracuse University, 1958

In September 1951, 191 men entered State University of New York Teachers College at Cortland. At the end of four years, June 1955, 116 men were classified as graduates or scholastic drop-outs in the two major curriculums of physical education and elementary education. To analyze some of the factors associated with retention in this teachers college, data were collected from admissions folders and scholastic records. To ascertain the relationships existing between selected characteristics of graduates and scholastic drop-outs, the design of this study was based on a number of factors as stated in the following questions which the study aimed to investigate:

- 1. What is the relationship between scores on the American Council on Education Psychological Examination and retention?
- 2. What is the relationship between scores on the Cooperative English Test and retention?
- 3. What is the relationship between the high school academic average and retention?

- 4. What is the relationship between scores on the American Council on Education Psychological Examination and first semester quality point ratio?
- 5. What is the relationship between scores on the Cooperative English Test and first semester quality point ratio?
- 6. What is the relationship between the high school academic average and first semester quality point ratio?
- 7. Does success in this teachers college, as measured by quality point ratio, have a relationship to retention?

The high school average was computed by using the recorded school grade or Regents grade (whenever recorded) for English, mathematics, social studies, and science. All students who dropped out of college for any reason with less than a 2.00 grade point ratio were considered scholastic drop-outs. All obtained scores on standardized admissions examinations were converted to scaled scores.

Data from all sources were hand tabulated for analysis by the critical ratio technique.

This study yielded results which show some relationship between admissions data and retention at this teachers college as follows:

- 1. Eighty-five percent of the scholastic dropouts in the elementary education curriculum achieved a high school average below 77.
- 2. Achievement of a satisfactory grade point ratio during the first semester in this college is significantly related to a high school average of 77 or above.
- Achievement of a satisfactory grade point ratio at the end of the first or second semester in this college is highly related to retention.
- 4. A low gross score on the ACE examination tends to be a reasonably good predictor of the drop-out rate for men in the elementary education curriculum.
- 5. The scholastic drop-out is most frequently associated with a low ACE Linguistic score and below C average for the first semester of academic work.
- The ACE Quantitative score values fail to discriminate characteristics of graduates or scholastic drop-outs.
- 7. The Cooperative English C₂ score acn be used to distinguish the men in this college most likely to achieve a satisfactory first semester grade point ratio.
- 8. The Cooperative English Total English score clearly distinguishes the potential retention status of men in the elementary education curriculum.

This study of selected characteristics of graduates and scholastic drop-outs was intended to be useful as a basis for guidance at both the secondary and college levels in terms of college selection, admission to college, and retention in college.

It is recognized that every college admissions process involves judgments as to the future performance of the candidates. By inspection of the results and by statistical analysis of data from this study, many items appear to have a relationship to retention in this teachers college.

Microfilm \$2.95; Xerox \$10.00. 225 pages.

THE PREPARATION OF STUDENT TEACHERS IN THE SOCIAL STUDIES DEPARTMENT IN THE SCHOOL OF EDUCATION IN NEW YORK UNIVERSITY

(L. C. Card No. Mic 58-5649)

Anabel Sober, Ed.D. New York University, 1958

Chairman: Professor Alonzo F. Myers

The Problem, Its Importance and Background

The Social Studies Department, School of Education, New York University, is dedicated to make its student teaching experiences the most valuable possible and to equip the students with sufficient skills, understandings and insights to meet their teaching efficiently and effectively. This study was undertaken to assist the Department to reappraise its teacher education program in the light of the needs of the profession to assure the students an optimum preparation. This was done through identifying the strengths and weaknesses in the preparation of the student teachers and proposing corrective adjustments through which the program might be emended.

The study was centered around the Student Teachers who had taken their entire undergraduate degree program with the Social Studies Department; the teacher-preparing institutions in New York City which share the unique features of teacher education with the School of Education, namely, Fordham University, School of Education, Brooklyn, Hunter and Queens Colleges; the University Supervisors and Cooperating School Personnel who were identified with the Student Teachers.

Procedures in Collecting Data and Types of Data Collected Data were collected through: (1) An investigation of the literature in the field of teacher education and the social studies, for factors considered necessary for success in teaching and student teaching; (2) An evaluation instrument constructed for measuring student teaching performance; (3) A Panel of Experts who validated the instrument and supplemented the information of an investigation of the total educational and professional programs and policies currently in practice in the teacher-preparing institutions in New York City and the New York City Board of Education; (4) The School of Education personnel, namely, Office of Admissions, Director of the Two-Year Program, Coordinator of the Social Studies Student Teaching, Director of Student Teaching, and, Dean of Students; for the requirements to the School of Education, The Two-Year Program, the Social Studies Department, Student Teaching, entrance test requirements, and, for the records of the student teachers studied; (5) An investigation of the teacher education policies and programs of the teacher-preparing institutions in New York City and the New York City Board of Education, obtained from college bulletins, other printed material, and interviews; (6) A case study of each Student Teacher, showing the acceptance requirements and personal and educational progress, obtained, in part, through an evaluation instrument constructed for use by the Student Teacher to delineate his critical analysis of his total program; (7) Criticisms obtained of the program by the University Supervisors and the Cooperating School Personnel.

Methods of Analysis, Most Significant Facts, Recommendations and Conclusions

The identified strengths and weaknesses of the Student Teachers and the educational and professional programs were correlated and summarized. Conclusions were drawn and recommendations for their continuance or corrective adjustments were proposed.

Significant strengths and some weaknesses were indicated in personality traits and trait actions; areas of preparation and scholarship; professional endeavors; and methods of teaching of the Student Teachers, and the pro-

cedures and policies of the colleges.

Fifty areas needing corrective adjustments were indicated and proposed solutions recommended. These were presented to the four leading educators in the School of Education most directly concerned with student teaching. The results showed that 50% or more of the educators felt all but one of the recommendations were capable of realization in a teacher education curriculum in New York City and were of sufficient magnitude to warrant the attention of the Social Studies staff. It was recommended that the entire list, except the one dealing with the establishment of a laboratory school, be presented to the Social Studies staff for their capable direction.

Microfilm \$5.20; Xerox \$18.60. 407 pages.

EDUCATION, THEORY AND PRACTICE

CREATIVE EXPLORATIONS IN PAPER SCULPTURE:
A GUIDE FOR TEACHERS OF CHILDREN
OF THE MIDDLE GRADES
(PARTS I AND II)

(L. C. Card No. Mic 58-5645)

Edith C. Becker, Ed.D. New York University, 1958

This study presents explorations in paper sculpture as a medium of creative expression for children of the middle grades. The study consists of two parts. The first part is concerned with the interests and needs of preadolescent children. It also deals with the nature of creative expression and its relationship to child development and to the creative potentialities of paper used dimensionally.

The second part consists of a guide prepared for class-room teachers of grades four, five and six. It is based on an understanding of the interests and needs of preadolescent children. The explorations presented are those which have been used with teachers and children of the middle grades. The format of the guide was developed according to the expressed need of teachers for help in guiding explorations in paper sculpture as a part of their creative arts program.

The study is based on the principles that all children

possess the desire and the potential for creative expression and that the life of the child may be enriched through art expression. The investigator recognizes the need for fostering the creative urge and the prime importance of children's needs and interests as motivational drives.

A review of the literature in the area of children's interests in out-of-school and school activities reveals that while it is possible to generalize with respect to trends for certain age levels, individual differences transcend the importance of group data. The most significant implication resulting from the study of children's interests lies in the reaffirmation of the strength of individual differences. The most useful educational concept advanced recently is that of the developmental task which recognizes that the needs of children must be balanced by the needs of society. The wide differences in the dominant interests and the stages in the developmental needs of children within any group calls for flexibility and variety in both the nature of the activities engaged in and in the procedures used.

The area of creative expression, in general, and that of three dimensional explorations in paper, in particular, presents almost limitless opportunity for providing the flexibility and variety needed within the school program for children of the middle grades. Children's enthusiasm for graphic expression is on the wane after the third grade due to their growing awareness of their limited technique, adult standards, and stereotypes. Three dimensional explorations in paper help preadolescent children to modify these repressive forces by providing opportunity to construct tangible products, develop pride in workmanship, and build confidence through more favorable audience reaction from their peers.

It is the intent of this study that three dimensional explorations in paper should not be considered as the only creative art activity, but should provide one means of contributing to the total art experiences and the development of the child.

Microfilm \$2.65; Xerox \$9.20. 202 pages.

CORRECTIONAL EDUCATION IN PENAL AND CORRECTIONAL INSTITUTIONS IN THE UNITED STATES

(L. C. Card No. Mic 58-7440)

Carlton Herbert Bowyer, Ph.D. University of Missouri, 1958

Supervisor: Dr. Lloyd P. Jorgenson

The purpose of this study was to investigate the philosophy and practice of correctional education in penal and correctional institutions in the United States.

The category of penal institutions includes prisons and penitentiaries, while the category of correctional institutions includes reformatories and juvenile institutions. Correctional education refers to education in both types of institutions, and is that education designed to affect attitudes and behavior.

While certain historical materials were presented in this study, the major portion is based upon empirical data gathered by means of an educational questionnaire. Correctional education today is an organized program which includes the areas of academic, vocational, and social education. The purpose of these combined phases is threefold: to provide a general educational background; to equip the individual to earn a living; and to create a desire within the individual to conform to the mores of society.

Although there are many similarities between the correctional education programs and the public school programs, the correctional educator is not bound by the public school curriculum. The task of correctional education is a unique one, and requires expansion in the area that most directly affects the attitudes and values, social education. This area is not well developed in penal and correctional institutions, for there is no well defined social education program that is consistently applied throughout the different institutions.

The growth of correctional education is evidenced by the inception of new programs, and increase in the numbers of inmates participating in the programs, and an increase in the numbers of qualified personnel directing these programs. The major obstacles to continued growth are the lack of public sympathy and understanding, and the lack of adequate budgets to finance the programs.

There is little doubt that correctional education is performing a service for those inmates participating, but compulsory education must be established in both penal and correctional institutions. It is impossible to measure the success of correctional education on the basis of the minority now participating in these programs.

Microfilm \$3.50; Xerox \$11.80. 270 pages.

A STUDY OF THE ROLE AND FUNCTIONING OF THE LOCAL UNIT OF THE FLORIDA CONGRESS OF PARENTS AND TEACHERS

(L. C. Card No. Mic 58-5991)

Alfred Dermer, Ed.D. The Florida State University, 1958

The study involved four steps which are briefly described in the paragraphs which follow:

Step 1 of the plan for the study required the investigator to ascertain the criteria governing the role and purpose of the Local Unit as viewed by the State and National Congresses of Parents and Teachers.

Step 2 required the investigator to secure and analyze evidence regarding the role and purposes actually being carried out by Units of the Florida Congress. This was accomplished through compiling and analyzing the data obtained from the returns of the Local Unit Evaluation Form filed in the State Office by 511 of the 899 Units of the Congress for 1956-57.

Step 3 required the investigator to secure and analyze evidence regarding levels of practice with respect to the role and purpose actually being carried out by the Units of the Congress. This was accomplished in part by developing, validating and distributing a Practices Questionnaire to which 288 of the 899 Units of the Florida Congress responded. In addition, reports of five types of Local Unit Chairmen to their State counterparts were analyzed.

Step 4 required the investigator to make any observa-

tions or conclusions, and suggestions or inferences justified in the light of the data.

The major conclusions were:

1. Most of the Local Units performed well with respect to those definite or routine activities or procedures endorsed and publicized by the Florida Congress.

2. About one-fourth of the Units performed well with respect to activities and procedures requiring high level judgment and creativity needed not of the definite and routine type endorsed by the Florida Congress.

3. Local Units in low socio-economic level counties performed generally at lower levels of practice than did those in the middle and upper socio-economic level counties.

4. Local Units, regardless of their location in the State, varied little in responses to items requiring them to translate P.T.A. Objects into action or practice.

5. Local Units have not reached any high level of understanding regarding: (a) how local concerns and state and national concerns for the welfare of children are interrelated, (b) the relative importance of one activity or chairmanship in relation to the entire range of activities and chairmanships, and (c) the values which materials published by the State and National Congresses have for meeting their felt purposes and needs.

The following major recommendations appear justified by the data gathered and analyzed:

1. Local Units and the Florida Congress should examine carefully their present understanding of P.T.A. Objects, with a view to developing a philosophy that will serve as a realistic guide to action.

2. The findings of research should be examined to enable the membership to ascertain: (a) what constitutes democratic action at all levels of P.T.A. operation, (b) what constitutes desirable and effective ways of motivating individuals and groups toward dedicated effort, intelligent action and continuous growth in P.T.A. work, and (c) what the phrase "promote the welfare of children" means when viewed in a psychological and social context.

3. The State Congress should move immediately to strengthen the leadership and resources available to Units in all areas of the State, and, in particular, to those in the low-level, socio-economic counties.

4. The State Congress should make a thorough study of the channels of communication it now uses, with a view to improving the quality of constructive guidance furnished to Local Units.

5. Certain types of activity and study promoted by the State Congress need re-assessment in terms of values actually obtained by the membership engaging in these.

Particularly, it is hoped that the results of this study will be of special benefit in the improvement and expansion of efforts through further self-evaluation by the Local Units and the Florida Congress of Parents and Teachers.

Microfilm \$2.70; Xerox \$9.40. 208 pages.

A GUIDE FOR THE FABRICATION OF PUPIL MADE DIORAMAS IN THE JUNIOR HIGH SCHOOLS OF NEW YORK CITY

(L. C. Card No. Mic 58-5647)

Joseph William Duffy, Ed.D. New York University, 1958

<u>Problem</u> The purpose of the study was to develop a guide for the fabrication of pupil made dioramas, for use in social studies units in the junior high schools of New York City.

<u>Delimitations</u> The activities included were developed primarily for use by industrial arts and social studies teachers and pupils, and were based upon the aims, content and methods of the respective programs suggested in the New York City curriculum bulletins.

Need For The Study There are many teaching situations in which the use of a three-dimensional, scale model or diorama would be of real learning value, but such material is not available. If dioramas are to be used they must be developed and made by the teachers and students. Many courses of study make mention of the construction of the diorama as a type of desirable activity.

The diorama can be employed as an instructional aid to make instruction adventuresome, concrete, and clear. It can be employed as a medium with which to challenge the sensory motor world of the student, to motivate the learning experience, and to make teaching personal. It can be employed by teachers as a means of integrating work in several subject areas.

<u>Procedure</u> In order to develop a guide for the fabrication of pupil made dioramas the following sub-problems were investigated:

1. To determine the major topic areas in the social studies curriculum which are appropriate for development into dioramas.

The Social Studies Course of Study of New York City lists three hundred and ninety eight topic areas that are to be taught in the 7, 8, and 9 grades. It was, therefore, necessary to reduce this list.

The investigator, working with an authority in diorama construction, determined the criteria to be used in selecting topics suitable for diorama construction.

The only process that involved many different and varied operations was that concerned with making the foreground. An inventory of the physical features was taken and those of similar construction techniques were categorized.

2. To discover fabrication techniques in constructing dioramas in order to implement the common operations and processes as ordinarily used in the New York City Schools.

The investigator visited both museum and commercial diorama manufacturers to observe current practices and techniques in diorama making. Those techniques that involved no element of risk, used materials that are easily acquired, employed no special equipment and required new skills were photographed or illustrated in the guide. A panel of five industrial arts and five social studies teachers selected those techniques based on the aforementioned criteria.

3. To list step-by-step fabrication techniques that can be employed by the social studies teacher, industrial arts teacher and their pupils, to make the teaching aids determined in sub-problem #1.

The investigator listed each process in order of fabrication. Each operation was fully illustrated. A panel of teachers reviewed the guide to determine whether or not it satisfied the aforementioned criteria.

 To make a list of the materials, tools, related literature, and their sources needed to make these three-dimensional displays.

Three separate and distinct lists were made: the materials list, comprising the tools and materials; the related literature list of books, magazines, pamphlets and brochures; and the list of hobby and model centers in the New York City area that provide guidance and assistance in model building. The guide thus provided will be of value to both teachers and pupils who plan to construct dioramas for classroom use.

Microfilm \$4.15; Xerox \$14.00. 322 pages.

A STUDY OF ACTIVITIES WHICH CAN BE USED IN ELEMENTARY SCIENCE TO ENABLE STUDENTS TO ARRIVE AT AN UNDERSTANDING OF GENERALIZATIONS RECOMMENDED BY SYLLABUSES OF STATE EDUCATION DEPARTMENTS

(L. C. Card No. Mic 58-7215)

Mary Catherine Durkee, Ph.D. Syracuse University, 1958

The purpose of this study was: (1) to discover what basic principles or generalizations are included in an elementary science program, (2) to determine what per cent of these generalizations could be handled by an activity or experimental approach, (3) to determine how well these activities might serve to enable a student to arrive at an understanding of the generalization, and (4) to determine which generalizations do not lend themselves to an activity treatment.

The need for this study grew out of the writer's desire to try to discover the extent to which an activity approach to elementary science is possible. From her observations, science is all too often taught by the teacher's placing the same book in the hands of every child and allowing the pupils to "take turns" reading orally, a method which falls short of being an adequate science program.

First, contact was made with various state education departments for courses of study. Twenty-two were studied and a listing was made of the generalizations that were found in the majority of them. They were divided according to six main topics, with a breakdown by broad grade levels (primary and intermediate).

Then modern textbooks, professional methods books, teachers' manuals (this involved a total of sixty-seven books), and the courses of study themselves, were studied to get a listing of activities or experiments. These were then assigned to the generalizations or basic understandings listed, to determine what per cent of the basic understandings could be clarified by an activity.

In order to determine how well these activities might serve to enable a student to come to a better understanding

of the generalization, each generalization, with its accompanying activities, was submitted to at least two science experts for their evaluation. Twenty-seven experts were used in all.

An expert was defined as one who was regarded in science circles as being outstanding in the teaching of science, and had a good background in science content.

To determine how well these activities might serve to enable students to arrive at an understanding of the generalization, the experts rated them on a six point scale, ranging from "U" (unsatisfactory) to "3" (adequately serves to bring about an understanding of the basic principle).

When the activities were returned, they were tabulated. Where there was a great difference of opinion between two respondents, it was submitted to a third person. In minor differences of opinion, the author attempted to strike an average rating or took the lower (the more conservative) of the two ratings.

The tabulation also fulfilled the fourth purpose of the study—to determine which generalizations do not lend themselves to an activity approach.

The generalizations totaled 867. A tabulation of the ratings disclosed that for 89.2% of these generalizations, suitable activities were found (a total of 1863 activities). The degree to which these activities might serve to enable a student to arrive at an understanding of the generalization was ascertained by surveying the scores assigned to them by the experts. A listing was made of the generalizations for which no suitable activity could be found.

Recommendations for futther study were also made. They include studies regarding: ways of making the generalizations, for which no suitable activity could be found, more understandable; the nature, value and types of field trips; the reinforcement value of techniques other than the textbook type lesson; the optimum number of activites needed to insure an understanding of a generalization; the ability of pupils to draw correct conclusions; the adequacy of present syllabuses; causes for present weaknesses in the average elementary science program; and types of pre- and in-service work for elementary teachers.

Microfilm \$6.60; Xerox \$23.20. 518 pages.

THE PRODUCTION AND EVALUATION OF FOUR SOUND FILMSTRIPS ON THE SUBJECT OF ATOMIC BONDING, DESIGNED AS A SUBSTITUTE FOR THE LIVE CLASSROOM LECTURE: A CASE STUDY

(L. C. Card No. Mic 59-626)

Solomon Dworkin, Ph.D. Syracuse University, 1958

The problem undertaken in this dissertation was to determine if sound filmstrips could be used as substitutes for a teacher's lectures if all other conditions surrounding the teaching-learning situation remained unchanged.

As part of the experiment, four sound filmstrips, each of forty-five minutes running time, were specially produced by the teacher of the experimental course and an audio-visual specialist.

The experimental evaluation of the filmstrips was conducted with thirty-nine matched pairs of graduate engineers and physicists who were studying a course in the

Physics of Solids at a school conducted by Bell Telephone Laboratories for new employees. The unit chosen from the course for the experiment was The Bonding of Atoms.

All conditions surrounding the teaching-learning situation were left unchanged for the control group. The only change introduced for the experimental group was the use of the four sound filmstrips as substitutes for the live lectures by the teacher.

The difference in learning between the two groups was determined by means of an examination consisting of true-and-false, multiple choice and problem items. In addition, a questionnaire was administered for the purpose of obtaining the students' evaluation of the four filmstrips.

The examination results indicated that there was no significant difference between the scores of the two groups as measured by the critical ratio technique.

The questionnaire results indicated that graduate students who are studying physics, are willing to accept sound filmstrips, to a limited extent, as substitutes for live lectures by a good teacher.

The conclusion is drawn that sound filmstrips can be substituted for live lectures, to a limited extent, on a graduate level in physics, when all other conditions of the teaching-learning situation such as recitations, problem assignments and assigned readings, are maintained.

Furthermore, the conclusion is drawn that sound filmstrips of full lecture-period length can be produced with a low budget and the use of simple production techniques.

Microfilm \$2.15; Xerox \$7.60. 161 pages.

THE ACCEPTABILITY OF CERTAIN PRINCIPLES OF SECONDARY EDUCATION AND THE IMPLICATIONS FOR NEWFOUNDLAND EDUCATION

(L. C. Card No. Mic 58-7384)

William Joseph Gushue, Ed.D. Boston University School of Education, 1958

Problem and Purpose:— The purpose of this study was to compare the acceptability of principles of secondary education among a group of professors of education in the United States, the secondary school principals in Newfoundland, 300 secondary school principals in the other Canadian provinces, the officials at the Newfoundland Department of Education, and 500 leading Newfoundland citizens.

Justification: -- Newfoundland's system of education has remained comparatively static for decades. Many signs indicate that changes are imminent. But what direction should these changes take? On what principles of education should the system be based? Where should the province look for guidance? These are some of the questions that this study was to answer.

Procedure: -- A list of principles which were derived from authoritative sources and grouped under four areas objectives, curriculum, instruction, and evaluation - was submitted to a jury of 34 professors of education in the United States for validation purposes. Upon their recommendations, a questionnaire of 91 principles was devised. Respondents were asked to score their acceptance of the principles on a five-point scale, ranging from strongly agree to strongly disagree.

When the data were tabulated the four other groups

were first compared with the American; then the three Newfoundland groups with the Canadian, and finally the Department officials with the principals and the citizens. The statistical procedure used was that of finding the differences between percentages. The .01 level was selected as the criterion of significance.

Results

- 1. The Newfoundland Department officials, principals, and citizens showed very strong agreement with the American professors, differing significantly from the latter on 6, 23, and 29 statements, respectively.
- 2. Newfoundland educators showed closer agreement with the American educators than did the Canadians. The officials showed closer agreement on 66 statements and the principals on 53. The citizens differed from the Americans to about the same extent as the Canadians.
- 3. Little difference of opinion was observed among the three Newfoundland groups. The principals and lay citizens differed significantly from the officials on 7 and 14 statements, respectively.
- 4. Newfoundland educators and citizens almost unanimously approved of the present practice of teaching religion in the schools.
- 5 The Newfoundland groups accepted as objectives of the high school the Seven Cardinal Principles, as well as the development of sound habits of thinking, an appetite for learning, and an appreciation of the finer things of life.
- 6. Newfoundland educators and citizens showed disapproval of a text book curriculum which is determined by the central authority and favored one that is determined by all concerned and which is broad enough to help meet the needs of the students and the community.
- 7. The Newfoundland groups favored a more relaxed classroom atmosphere and an instructional program that would provide for the varying abilities and interests of the students as well as a wide variety of teaching materials.
- 8. The great majority of the Newfoundland groups registered disapproval of the province's external examinations.

 Microfilm \$2.60; Xerox \$9.00. 199 pages.

DETERMINATION OF THE RELATIVE IMPORTANCE OF ITEMS OF CONTENT AND PRACTICE IN RADIO AND TELEVISION TRAINING PROGRAMS

(L. C. Card No. Mic 59-439)

F. Virginia Howe, Ed.D. Boston University School of Education, 1958

<u>Purpose</u>. The purpose of the study was the determination of the relative importance of items of content and practices in radio and television training programs at the college and university level. Need for the study evolved from statements of persons representing professional organizations. A review of literature revealed little objective research concerned with the content of radio and television curricula.

Procedure. The study was divided into three major phases. The first phase consisted of an analysis of selected textbooks and periodicals to obtain a list of items of content and practices of radio-television education suitable for use at the college level. A page-by-page analysis of these sources was made. Each statement which satisfied the definition of an item of content or practice was recorded together with the source. Statements then were formulated according to knowledge and understanding of, and skill or practical training in, a specific item of content or practice for radio-television education. Items were arranged under four topical areas: Announcing, Programming, Writing and Management.

The second phase was concerned with the determination of the validity of the 217 items obtained in phase one. Validity was established by submitting the list to a jury of 20 authorities in the field of radio-television education and commercial broadcasting. Re-wording, revision and additions were made in the items of content and practices as indicated by 75 per cent or more of the jurors. The result was a list of 220 items considered by the jury as being consistent with current and accepted radio-television education and research.

The relative importance of the items of content and practices was determined in the final phase by submitting them to 324 radio-TV educators and 192 commercial broadcasters throughout the country. To reduce the load for the respondents, each received one fourth of the total number of statements systematically divided as: 1, 5; 2, 6; 3, 7; 4, 8 and so on. Based on weighted numerical scores the items were ranked in descending order of importance by each group and the combined groups. Coefficients of correlation were computed by the Spearman rank order methods.

Conclusions. The high coefficients of rank correlation between the two rating groups in the four topical areas indicate a unanimity of appraisal as to the relative importance of the items. Results indicate that it is highly important for a radio-TV curriculum in higher education to include: (1) an appreciation of the cultural significance of the broadcasting medium and practical training experience in it, (2) training and experience in general broadcasting, studio operations, formats, terminology, production, audience, advertising, salesmanship and public relations, and (3) knowledge of communication laws, codes, standards of practice and responsibilities to station, community and listeners.

It is relatively important to include: (1) knowledge and understanding of the social and economic significance of broadcasting, history and development of the industry and non-technical audio and video mechanics of the media, (2) experience in writing, programming and music library operations, (3) study in the liberal arts and social sciences, (4) familiarity with the trade journals, and (5) a commercial internship.

It is relatively unimportant to include: (1) experience in photography, scene design, patching, film developing equipment, engineering and conelrad operations, and radio-TV acting, and (2) study of foreign languages.

Microfilm \$3.75; Xerox \$12.80. 292 pages.

GRADED STUDY GUIDES FOR SIXTH GRADE SOCIAL STUDIES

(L. C. Card No. Mic 58-7385)

Annie Lee Jones, Ed.D. Boston University School of Education, 1958

Problem

The purpose of this study was: (1) to develop graded study guides for use in paired practice in sixth-grade social studies, and (2) to evaluate the effectiveness of this procedure as one means of improving the power of recall and the ability to comprehend and retain subject matter.

Procedure

Forty-four study guides based on Ginn and Company's textbook, Your World and Mine, were constructed. They included: fifteen detailed-question lessons in aided recall; fourteen outline-techniques exercises in summarizing; and fifteen general-question lessons in unaided recall. The study guides were planned for use in the regular social studies period for twenty-five teaching days. Children worked independently in pairs within three ability groups, with each group progressing at a different rate.

The study was conducted in two public school systems within a fifteen-mile radius of the city of Boston. Five hundred and twenty-three pupils were divided into two groups, with 265 in the experimental group and 258 in the control. Groups were equated on the basis of chronological age, mental age, reading achievement, and ability in oral recall.

The following battery of seven tests was administered:
(1) Otis Quick-Scoring Mental Ability Test, Beta Test,
Form A; (2) Gates Reading Survey for Grade 3 (2nd Half)
to Grade 10, Forms I and II; (3) a social studies test constructed by the investigator; (4) a modified form of the
Bogardus Social Distance Scale; (5) a pupil and a teacher
questionnaire developed for the purpose of evaluation; and
the following instruments developed at Boston University:
(6) Bucknam's selections for measuring oral and written
recall; and (7) a subject preference rating scale. Reliability was established on the original social studies test
and on each of the four recall selections, as tests of both
oral and written recall. Teachers evaluated the procedure
in individual conferences with the investigator.

Conclusions

- 1. Both groups made significant gains in oral and in written recall. Slightly greater gains were made in each by the experimental group; however, the difference in gains was not statistically significant.
- 2. The difference in mean score on the social studies test resulted in a critical ratio of 2.58 which favored the control group.
- 3. Gains were made by both groups in reading achievement, expressed as reading age. All gains and all differences between the gains of both groups in total reading age, comprehension, vocabulary, and the speed of reading lack statistical significance.
- 4. Significant gains were made in social acceptance among pupils in both groups.
- 5. No significant change was found in the attitudes of children toward the social studies.

- 6. Pupils in experimental classrooms enjoyed the lessons and liked working with a partner. They preferred: reading questions after reading the textbook; answering questions to one paragraph at a time; and giving answers orally.
- 7. Teachers observed that pupils generally liked the lessons and greatly enjoyed paired practice.

Criticisms and Suggestions for Further Study

These materials used with virtually complete self-direction on the part of pupils have had practically the same value as the regular teacher-directed method of teaching social studies. Previous research further indicates the value of team learning; therefore, additional research in this area seems justifiable. In future investigations using graded study guides in paired practice, the following changes appear advantageous:

- 1. Extend the actual working time of the study and cover the textbook material more slowly.
- 2. Shorten each study guide and provide more time for daily class discussions.
- 3. Limit the use of study guides to three or four lessons a week.
- 4. Provide for systematic review at regular intervals.
- 5. Employ a greater variety of materials.
- 6. Vary the approach more and add greater flexibility to the procedure.
- 7. Include specific provisions for enrichment activities.
- 8. Provide increased opportunities for pupil-teachers to work with the slower pupils who have reading difficulties.

Microfilm \$3.05; Xerox \$10.40. 233 pages.

AN EVALUATION OF E. C. TOLMAN'S SIGN-GESTALT THEORY OF LEARNING IN THE LIGHT OF SCHOLASTIC PHILOSOPHY

(L. C. Card No. Mic 58-7099)

Sister Mary Michel Keenan, I.H.M., Ph.D. University of Notre Dame, 1958

This study undertakes an evaluation of E. C. Tolman's Sign-Gestalt theory of learning in the light of Scholastic philosophy. It examines the unique conceptual and terminological problems present in Tolman's works, attempting to ascertain the extent to which a language, so Scholastic in tone, might also be in agreement with Scholastic thought in its meaning.

Three principal problems are examined, namely, that of the adequacy of Tolman's theory as a complete psychology of human learning; Tolman's use of a mentalistic descriptive language for his non-mentalistic, behavioristic theory of learning; and Tolman's important contributions to educational theory and practice.

After a presentation of the Sign-Gestalt theory in general, a detailed analysis and comparison is made of Tolman's concepts and those of Scholastic psychologists. The analysis follows the traditional Scholastic psycho-physical

division of the knowing process--the topics of sensation and perception, imagination, memory, intellect and will.

Four problematical areas in the teaching-learning situation are considered, namely, learning and forgetting, motivation, individual differences, and transfer of training-problems toward the solution of which Tolman makes a worthy contribution.

From the detailed analysis made in this study, it is possible to formulate the following conclusions:

- (1) Tolman's theory neglects the distinctly human processes of concept formation, judgment, reasoning, and will power, and fails to essentially differentiate the learning of animals and of men. It is, therefore, an inadequate theory of human learning.
- (2) From the consideration given to Tolman's definitions and to his terminological "creations," it is seen that only behavioristic meanings are provided, and that mentalistic reference is rejected. Terms, Scholastic in tone, are not Scholastic in meaning.

On the practical level, Tolman's theory makes important contributions to the psychology of learning, among which are the following:

- (1) Formulation of Capacity Laws as a provision for individual differences in learning.
- (2) Formulation of the Law of Emphasis as a modification of Thorndike's Law of Effect.
- (3) A new emphasis on "learning by discovery," as implied by the results of his experimentation on Latent Learning.
- (4) Suggestions for pedagogical procedure, with emphasis on the teaching of "patterned" and "organized" Gestalt-like wholes as opposed to the more mechanistic, drill-type part learning. Microfilm \$3.30; Xerox \$11.20. 254 pages.

AN INVESTIGATION OF THE EFFECTS OF AN INTEGRATED KINDERGARTEN-PRIMARY PROGRAM

(L. C. Card No. Mic 58-1180)

Mary Jean Upson Kluwe, Ed.D. Wayne State University, 1957

This investigation was undertaken to determine the relative effects of two types of kindergarten-primary programs, an integrated program and a traditional program. The specific questions to be answered through the study were:

- 1. What are the effects of an integrated and of a traditional kindergarten-primary program upon the reading readiness of children?
- 2. What are the effects of the two kinds of programs upon the personal and social adjustment of children?
- 3. To what extent do the effects of the programs vary for children representing the upper-middle, lowermiddle, and upper-lower socio-economic levels?

In the integrated program the kindergarten teacher and the first-grade teacher engaged in cooperative planning. They merged their classes on occasion. They exchanged classes at specified times.

It was hypothesized that kindergarten children who had participated in the integrated program would evince better reading readiness, as measured by scores achieved on a reading readiness test, than children who had experienced the traditional program.

It was also hypothesized that first-grade children who had experienced the integrated program while in the kindergarten and the first-grade would show better personal and social adjustment, in terms of scores achieved on tests of personal and social adjustment, than children who had experienced the traditional program.

Procedures

Three groups of two schools each were selected for comparative purposes. One of each pair of schools followed the integrated program; the other school followed the traditional program. The schools were equated on the basis of socio-economic setting, size of classes, length of the school day, and quality of teaching offered.

The <u>Detroit Reading Readiness</u> <u>Test</u> was administered at the end of the semester to 522 second-semester kindergarten children. Comparisons were made between the means of scores achieved by groups of: (a) matched pairs of children; (b) children selected at random; (c) youngest beginners; (d) children with average or above average mental ratings; (e) children with below average mental ratings.

The California Test of Personality was administered to thirty-three matched pairs of children at the beginning of the following semester. Comparisons were made of the means of personal adjustment test scores, social adjustment test scores, and total personal and social adjustment test scores achieved by matched groups of children.

In each comparison made, the direction of the difference in the means of test scores was noted. The null hypothesis at the .05 level of confidence was assumed in relation to the difference in the means of scores. The hypothesis was tested by the analysis of variance.

Findings

The differences in the means of reading readiness test scores achieved by comparable groups drawn from the experimental and control schools were, with one exception, in the predicted direction. There were some statistically significant differences at the .05 and .01 levels of confidence.

The differences between the means of personal and social adjustment test scores were in the predicted direction and were, with one exception, statistically significant at the .05 level of confidence or better.

The differences in the means of reading readiness test scores achieved by comparable groups of children representing the different socio-economic levels included in the study were, with one exception, in favor of groups that had experienced the integrated program. The differences in the means of scores of personal and social adjustment were, without exception, in favor of the experimental group.

Conclusions

The integrated program is somewhat more effective than the traditional program in promoting the reading readiness of children. The integrated program is decidedly more effective in promoting the personal and social adjustment of children.

The integrated program is generally more effective in promoting the reading readiness of groups of children representing the upper-middle, lower-middle, and upper-lower socio-economic levels. It is markedly superior in promoting the personal and social adjustment of matched groups of children representing each of these socio-economic levels.

Recommendations

Further research is suggested to determine the effects of integrated and traditional kindergarten-primary programs upon children representing socio-economic levels other than those included in this study.

Research is suggested to determine the effects of integrated and traditional kindergarten-primary programs upon children who transfer to other schools at the end of the kindergarten year.

Research is needed to find the means and merits of providing integrated programs beyond the kindergarten and first-grade level.

Microfilm \$3.70; Xerox \$12.40. 285 pages.

AN ANALYSIS OF FRESHMAN WRITING AT THE BEGINNING AND END OF A YEAR'S WORK IN COMPOSITION

(L. C. Card No. Mic 58-7403)

Joseph Washburn Miller, Ph.D. University of Minnesota, 1958

The purposes of the study were (1) to develop a reliable method of grading freshman themes, and (2) to determine the improvement in writing made by freshman English students at the University of Minnesota. Pairs of themes written at the beginning and end of the school year were analyzed to determine the extent and kinds of improvement shown.

A rating scale was devised, including an over-all grade, three items of structure, three of content and presentation, and seventeen errors in mechanics, or weaknesses in construction. The scale was applied by five graders to 100 randomly selected impromptu themes written in 1949-1950 and 1950-1951. The median correlation between graders for the over-all grade was .375, and the reliability coefficient .73. The variability among the graders was even greater for the other items.

The scale was revised to contain an over-all grade, six items of quality of writing, and seven mechanical errors, and applied independently by three graders to 200 randomly selected pairs of the themes, written at the beginning and end of the school year. The median correlation for grades and qualities was .46, and the median reliability coefficient .73. There were statistically significant disagreements among the graders on all but two of the items, the comma splice and dangling modifiers.

The mean over-all grade of all 400 themes, and the mean ratings on Maturity, Organization, and Sentence Structure, were D+. The mean ratings for Originality, Thesis, and Vocabulary were C-. No significant differences were found between mean grades or ratings when

pairs of themes were compared on the basis of sex, age, or classification of the writers, or continuity of instruction.

2029

Themes by students in professional schools had slightly higher ratings than those by students in the arts college, in over-all grade, Maturity, Thesis, Organization, and Vocabulary. Themes by students from high schools outside the Minneapolis-St. Paul area had slightly higher ratings in over-all grade, Sentence Structure, and Vocabulary.

The 100 pairs of themes written in 1950-1951 had slightly higher ratings in over-all grade, Maturity, Originality, Thesis, and Organization than the 100 pairs written in 1949-1950, and had fewer sentence fragments and fewer errors in spelling. Themes of 1949-1950 students in the course "Communication 1-2-3" showed slight improvement over the year in over-all grade, Originality, Sentence Structure, and Vocabulary, but the number of comma splices increased. Themes by "Communication" students in 1950-1951 showed improvement only in spelling. Themes of 1950-1951 students in the course "Composition 4-5-6" showed slight improvement over the year in Originality, Vocabulary, and spelling. Final themes of 1950-1951 "Composition" students were slightly better than those of "Communication" students in over-all grade, Maturity, Originality, and Vocabulary.

Neither rating scale achieved satisfactory reliability. The graders differed widely in their evaluations of the over-all grade and the qualities of writing, and those errors which could be clearly identified appeared to be the least frequent and the least important in affecting writing quality.

The improvement after a year of freshman English was very slight, in no case greater than an increase from D+ to C-. The majority of the 200 students whose paired themes were evaluated received the same ratings on both beginning and final papers, although in general more students received higher ratings on the second theme than received lower ratings.

The study demonstrated the need for further research in the factors of writing ability, the components of "quality" in expository writing, and ways in which to increase objectivity and reliability of theme grading.

Microfilm \$2.75; Xerox \$9.60. 212 pages.

EFFECTS OF DIFFERENT TYPES OF KINDERGARTEN PROGRAMS UPON READING AND ARITHMETIC READINESS

(L. C. Card No. Mic 58-1723)

Melvin Linder Miller, Ed.D. University of Illinois, 1958

The purpose of this study was to determine if any of three types of kindergarten programs yielded significantly different results in the development of reading and number readiness. The effects of the various programs were considered in terms of an initial advantage and a persistence of it after a summer vacation. Two main hypotheses and two subsidiary hypotheses were under test in this experiment. A general null hypothesis underlay all to the effect that there was no significant differences in the mean accomplishment on readiness tests of kindergarten groups

with three different treatments in a reading readiness program and a number readiness program.

Six intact sections of kindergarten children, attending two adjoining schools, were formed into three treatment groups. These groups were selected from an area in which existed comparable home and community influences that were considered to have an effect on the development of reading and number readiness. Each treatment group was considered as a sample from a population defined by the treatment method employed.

The three kindergarten programs differed in the amount and kind of emphasis on reading and number readiness as well as the method by which these activities were incorporated into the kindergarten program. One treatment group followed a treatment method which placed no special emphasis on reading and number readiness activities. The second treatment group incorporated a special emphasis on reading and number readiness into the normal on-going kindergarten activities. The third treatment group utilized selected commercial materials in reading and number readiness in the manner prescribed by the authors of the materials. Special and selected materials, methods, and activities were utilized by this group.

Prior to introducing the treatments into the three groups, a measure of intelligence was secured for each case by the use of a group intelligence test, the <u>Detroit Beginning First Grade Intelligence Test</u>. At the close of the treatment period the <u>Gates Reading Readiness Tests</u>, the <u>Metropolitan Readiness Test</u>, and the <u>New York Test</u> of <u>Arithmetical Meanings</u> were administered to secure measures of reading readiness and number readiness. One of the test batteries, the <u>Metropolitan Readiness Test</u>, which had been administered to the kindergarten children at the close of the treatment period in June was re-administered to the same children as first graders in September.

Statistical treatment of the data by the use of analysis of covariance yielded values of the F statistic which were used to test the four null hypotheses. The findings of the experiment indicated that there was no significant difference in the mean accomplishment in either reading readiness or number readiness at the close of the treatment period of three kindergarten groups that have had different treatments in their reading readiness and number readiness program. The findings further indicated that there was no significant differences in mean accomplishment in either reading readiness or number readiness after the interim of a summer vacation of three kindergarten groups that have had different treatments in their reading readiness and number readiness program.

Upon the basis of these findings and within the limitations operating in the investigation, the conclusion was drawn that the three kindergarten programs in their initial and persisting effects were in general equally effective in developing reading and number readiness. It appeared that no one of the three programs yielded significantly better results than any of the others in the development of reading and number readiness in kindergarten.

Microfilm \$2.00; Xerox \$6.80. 144 pages.

A CRITICAL ANALYSIS OF SCIENTIFIC RESEARCH IN PHONICS

(L. C. Card No. Mic 59-37)

Victor Eugene Morrone, Ph.D. University of Pittsburgh, 1958

The purpose of this study is to obtain, to analyze, and to evaluate the scientific research in phonics through 1957. The problem is divided into the following elements: (1) to discover the value of phonic methods in reading as revealed in these studies; (2) to determine the optimum time to teach phonics as revealed in these studies; (3) to discover the value of phonic methods in spelling achievement as revealed in these studies; and (4) to organize and to summarize the derived generalizations from the accurate investigations which should help to promote better reading and spelling programs.

A total of 198 references was obtained from various bibliographical sources and from the bibliographies included in the analyzed studies. An examination of the references revealed that 101 were original phonic studies in reading and spelling. The investigations were critically analyzed and evaluated on the basis of the following criteria developed by Monroe and Engelhart: (1) definition and restriction of the experimental factor; (2) control of pupil factors; (3) control of important nonexperimental factors; (4) accuracy and validity of measures of differences in achievements; and (5) justification of generalization. Only 33 of the studies that were critically analyzed fulfilled the requirements of the established criteria of evaluation. The findings from the accepted investigations provided the information that was utilized in the formulation of the generalizations for the improvement of spelling and reading.

Appropriate tables are organized to present the important findings and conclusions of the accepted studies. Each table is followed by a detailed summary of these investigations to give the interested reader a more complete description. The final section of each chapter deals with the generalizations on phonics in reading or in spelling.

The studies that failed to fulfill the established criteria of evaluation are included in an annotated bibliography. Some of the findings from the rejected studies are compared with the findings of the accepted studies.

Some of the following conclusions are the result of a critical analysis of available scientific research on phonics in reading and spelling. The scientific investigations on phonics in reading and spelling do not reveal much unrefutable evidence. Many of the studies fail to define the terms phonics and phonetics. Disagreement exists as to the approach and amount of phonic instruction teachers should utilize in reading; however most of the scientifically accurate experiments show that phonics have considerable value to the learner in the reading process. Research reveals that there is a significant correlation between phonics ability and reading achievement. There is little available evidence that discloses the optimum mental age to teach phonics. The scientifically accurate research on phonics in spelling reveals a significant relationship between phonics ability and spelling achievement. Good spellers possess more phonics knowledge than do poor spellers.

A need for carefully controlled experimentation on phonics in reading and spelling is crucial. Accuracy must be emphasized in the techniques of scientific research with educational journals and masters' theses. Educators at all levels should scrutinize the scientific researches more carefully before a final decision is made. It is a fallacy to believe that a person well known in the profession will always present unrefutable evidence in a scientific investigation. Microfilm \$2.60; Xerox \$9.00. 197 pages.

AVERSIONS TO HANDWRITING

(L. C. Card No. Mic 58-7386)

Geraldine H. Quint, Ed.D. Boston University School of Education, 1958

Problem. -- The aim of this study was: (1) to locate sixth grade children who have an aversion to handwriting; (2) to discover what relationship exists between an aversion to handwriting and intelligence, motor abilities, and personality; (3) to study the relationship of an aversion to handwriting and achievement in handwriting, spelling, and written recall; and (4) to determine the attitude toward various specific factors of handwriting by children liking and disliking handwriting.

Procedures. -- Sixth grade children in two communities within 25 miles of Boston were used in the study. The 626 children were given the following tests: Kuhlmann-Anderson Intelligence Test, Form F; Beck Handwriting Scale; Metropolitan Spelling Test; Bucknam Written Recall Test; California Personality Test; MacQuarrie Test of Mechanical Ability. Also given was an initial inquiry form to determine individual attitude toward handwriting, and a questionnaire concerning attitude toward various specific factors of handwriting.

Data were analyzed by determining significance of the difference between percentages, significance of the difference between means, and the paired comparison technique.

Findings and conclusions.— An initial inquiry form found the following attitudes toward handwriting: a. 7.63 per cent dislike it very much. b. 5.11 per cent dislike it. c. 26.04 per cent neither like nor dislike it. d. 25.88 per cent like it. e. 35.14 per cent like it very much. f. 15.27 per cent of the boys dislike handwriting compared with 10.49 per cent of the girls. g. 13.98 per cent of the high I.Q. children dislike handwriting compared with 10.56 per cent of the low I.Q. children. h. 17.10 per cent of the children who have always done cursive writing dislike handwriting compared with 8.86 per cent of those starting with manuscript and later changing to cursive. However, these differences are not statistically significant.

Results of the questionnaire show that: a. Left-handed children show the same attitude toward handwriting as do right-handed children. b. Change of handedness does not affect attitude toward handwriting. c. Children disliking handwriting find their writing unsatisfactory in spite of real effort. d. Children disliking handwriting find formation of letters the most difficult aspect, while those liking it find keeping the same height the most difficult. e. 58.71 per cent indicate that they have a personal style of writing for out-of-school use. f. 67.90 per cent use a typewriter and 52.65 per cent have a typewriter in their home that they are allowed to use. g. 38.54 per cent prefer to use a ball point, 32.60 per cent prefer fountain pen, and 28.86

per cent prefer a pencil as a writing instrument. h. 72.48 per cent prefer writing on their own rather than in penmanship class. i. Of those children who have an aversion to handwriting, 78.21 per cent have disliked it at each grade level. j. If sixth grade children could do as they liked in penmanship class, they would practice only on those things that give them trouble.

Sixty-seven children who disliked handwriting were matched with children who liked handwriting. Children were paired for chronological age, mental age, and sex. Comparison of various test scores of these populations showed the following:

Children who disliked handwriting a. Had a significantly lower score on one test of motor ability (pursuit) and one significantly higher score (copying). The differences found on five tests were not significant. b. Had significantly lower scores on two tests of the California Personality (sense of personal worth and social skills). In ten tests no significant differences were found. c. Were poorer writers when writing was done with pencil; showed greater difficulties in letter size, spacing, slant, alignment, and line quality. The difference found in writing done with pen and ink or speed of writing was not significant. d. Were better in spelling but the difference was not significant. e. Were better in unaided written recall. No difference was found in multiple choice recall.

Microfilm \$2.20; Xerox \$7.80. 167 pages.

THE WIDENING OF HIGHER EDUCATIONAL OPPORTUNITY IN INDIA: (IN THE LIGHT OF AMERICAN THEORY AND PRACTICE)

(L. C. Card No. Mic 58-2307)

Mary Agnes Saldanha, Ph.D. Syracuse University, 1957

Purpose

The purpose of the study is to show that democracy demands a mass approach to higher education, and that therefore, in democratic India, the principle of equal opportunity in higher education should be increasingly recognized and extended. Higher Education, for purposes of this study, is defined as education at the post-secondary and undergraduate level.

Method and Procedure

The method chosen is philosophical and historical. The philosophical basis of equality of opportunity in higher education lies in the nature of democracy. The argument against the common man may be summed up as a fear of mediocrity and ineptitude. But the claim of the common man to equality of opportunity lies in his equal human worth which controverts social, economic and other mandecreed inequalities. A technological age demands a higher education for a large section of human beings, and hence, it is incumbent on the new India to provide opportunity equally to all.

The history of American higher education shows that opportunity was widened through the following measures: the expansion of the curriculum, the founding of more colleges and universities state interest in higher education, general education, the junior college, women's higher

education, the higher education of Negroes, the GI Bill of Rights and scholarship aid. An expanding scholarship scheme in which Federal and State Governments, Industry and Philanthropy share, is a boon to thousands.

Higher education in India was generally class-oriented

in the early and middle ages.

Modern Indian higher education which began in 1857, followed a British pattern, and was also generally confined to the classes. Expansion of opportunity among the masses as a planned measure, is scarcely in evidence until the dawn of Independence, 1947. The growth in opportunity within the past decade, has been unprecedented. The recommendations of the University Education include, among others, the expansion of facilities for technical and professional training, general education, rural universities and an extensive scholarship scheme. The educational effort in the Second Five Year Plan concentrates on opportunity for the socially underprivileged groups through an expanded scholarship system.

Conclusions and Recommendations

Except in respect of this effort, Indian higher education is far behind American in the matter of equal opportunity. Hence a redoubled effort is called for. But the following cautions are in place:

- 1. Indian higher education should proceed with reasonable care in curricular reform avoiding equally the dangers of over-specialization, superficiality and 'ad-hoc-ness'.
- 2. It should evaluate its progress periodically, so as to avoid excessive experimentation.
- 3. It should protect the liberal arts from the inroads of vocationalism, and the hierarchy of subjects from the theory of the equivalence of subject-matter.
- 4. It should draw philanthropy and industry more effectively to its aid.
- 5. It should guard institutional autonomy against all interference including governmental.

Implications for Future Research

This study of higher educational opportunity touches off a number of vital questions relating to curricular reform, finance, the democratic outlook, and the like, which the future researcher might examine for specific issues to investigate. Microfilm \$2.50; Xerox \$8.60. 189 pages.

A STUDY OF THE DUTIES OF MEDICAL SECRETARIES

(L. C. Card No. Mic 59-316)

Richard B. Scheetz, Ed.D. Temple University, 1958

The purpose of this study was to provide a more adequate basis than formerly existed on which to plan a vocational training program for medical secretaries for a particular institution.

The need for this investigation is emphasized in the literature where it is indicated that: (1) the status of the medical secretary is an anomalous one, and, (2) a shift in the emphasis on the duties required of physicians' secretaries had quite likely occurred as a result of recent extensions of medical services.

The problem was to determine the areas of training and the learning experiences which will develop in medical secretaries the skills, knowledges, and techniques required for initial employment.

Information used in arriving at a solution of the problem was obtained from literature relating to medical secretarial training and vocational education programs of junior colleges, a selected group of medical secretarial curricula, selected references on curriculum development and improvement, and a questionnaire survey of the requirements of a group of physicians in the area of the college community of their "beginning medical secretaries."

The following conclusions appear to be valid within the

limitations of this study.

Required Duties. In addition to the duties required of secretaries in general, the "beginning medical secretary" is required to complete medical report forms; make up and mail monthly statements to patients; transcribe patients' records and case histories in proper form; compose and send collection letters; determine charges for patients for routine services; determine which patients shall be sent charges; keep stock records of medical supplies and drugs; assign and conduct patients to the examination room; sterilize instruments, dressings, and equipment; position and drape patients properly for examination; assist the physician with minor surgery; perform laboratory tests on blood and urine; and, make physical measurements of pulse rates, respiration rates, blood pressure, body temperature, height and weight.

Skills and Knowledges Necessary. The "beginning medical secretary," in order to perform the required du-

ties, would need:

- 1. To be highly skilled in human relations.
- 2. To possess personal qualities, attitudes, and work habits desired by physicians.
- 3. To know the fundamentals of English, economics, business mathematics, and psychology.
- 4. To be skilled in both oral and written communication.
- 5. To possess all of the generally accepted secretarial skills.
- 6. To have an extensive knowledge of medical terms.
- 7. To have a knowledge of medical reports, medical and surgical practices, medical office procedures, and medical laboratory procedures.
- 8. Sufficient laboratory technique to perform tests on urine, make blood counts, and make physical measurements of the human body.

A Vocational Training Program for Medical Secretaries to be adequate must provide subject content and learning experiences which will develop in these secretaries the fundamental skills of human relations, desirable personal qualities and work habits, secretarial skills, medical knowledges, and medical laboratory techniques. Subject content of the program is important. Equally important are the methods by which the content is acquired. Work experience should be an integral part of the program. To insure adequate subject content the training program should provide for course work in: English, public speaking, economics, mathematics, psychology, typing, shorthand, medical shorthand, secretarial duties, account keeping, anatomy

and physiology, medical terminology, medical laboratory techniques, and medical office procedures. Practice in the application of acquired knowledges and skills in actual work experience situations must be a part of the training program. A minimum of two years would be required to provide for the course work and the work experience in a physician's office.

Microfilm \$2.35; Xerox \$8.20. 180 pages.

PRACTICES AND TRENDS IN THE TEACHING OF SECONDARY SCHOOL MATHEMATICS

(L. C. Card No. Mic 59-84)

Luther Leroy Shetler, Ed.D. Indiana University, 1958

Chairman: Philip Peak

For many years practices in mathematics education have been undergoing an evolutionary growth. Now the tempo has increased to a point where there are demands for revolutionary changes. Efforts to improve the teaching of secondary-school mathematics must be based on current practices and trends. Although several attempts have been made to identify these current practices and trends, all studies were based on "external" sources of information. The need for a direct approach—to get information from the schools and teachers of mathematics—has been pointed out in previous research.

<u>Problem:</u> The purpose of the study was to determine the <u>extent to</u> which the practices in use in the teaching of secondary-school mathematics agreed with the results of certain research studies and proposals, and to determine the extent to which these results were being incorporated into classroom practice.

Procedure: The procedures of the study were as follows:

- 1. Proposals of authorities concerning practices in the teaching of secondary-school mathematics were taken from professional literature in the field.
- 2. A pilot study (including personal interviews) was used in the development of a questionnaire on practices in the areas of aims, curriculum, methods, and evaluation. Major emphasis was on methods, broadly construed to include classroom organization, equipment, availability and use of resource materials, role of textbook, etc.
- 3. The questionnaire was sent to a ten percent random sample of all secondary schools in the 20 states in the North Central Association of Colleges and Secondary Schools.
- 4. The data from returns (54 percent) were transferred to IBM punch cards for processing.
- 5. Practices in use were judged as to their compatibility with practices deemed valuable by the authorities mentioned in number 1, above.

 $\frac{\textbf{Findings:}}{\textbf{lows:}} \ \ \, \textbf{The principal findings of the study were as follows:}$

1. There was general agreement between the opinions of authorities and practices in use concerning the choice and handling of aims for secondary-school mathematics.

- 2. Although multiple-track programs were well-established and increasing, many teachers still felt that their mathematics programs were inadequate.
- 3. The degree of agreement between expert opinion and practices in use concerning classroom methods and evaluation was spotty—high on some items and low on others.
- 4. Many mathematics teachers had inadequate classroom equipment and poor library facilities.

Conclusions:

- 1. The practices in the teaching of mathematics of the respondents in this study were, for the most part, stable and well-established.
- 2. There were no abrupt changes evident in the last five years although many of the practices were showing a slow growth.
- 3. There were two groups of teachers who consistently followed more closely the practices recommended by expert opinion. These were the teachers who spend most of the school day teaching mathematics and the teachers who are receiving one or more types of professional assistance in their teaching.
- 4. The larger schools and the city public schools also tended to follow more closely the recommended practices.

 Microfilm \$4.15; Xerox \$14.00. 321 pages.

A THEORETICAL BASIS FOR INDUSTRIAL ARTS IN THE PUBLIC SCHOOLS

(L. C. Card No. Mic 58-7603)

Darrell Dewitt Simmons, Ed.D. The University of Tennessee, 1958

Major Professor: Orin B. Graff

The purpose of this study was to clarify and, in some degree, reduce the confusion that appeared to exist in the area of industrial arts by investigating the theoretical basis for industrial arts in the public schools. Investigation was made into the following topics in arriving at a theoretical basis:

- 1. History and trends of industrial arts
- 2. Nature of man
 - a. Biological man
 - b. Philosophy--values--theory of mind
 - c. Theory of learning
- 3. Modern culture
 - a. Traditions
 - b. Machines--automation
 - c. Institutions -- home, school, church
 - d. Science
 - e. Democratic concept

From the treatment of the preceding topics nine learning needs were developed. These nine needs were to be employed toward program direction; however, guiding principles were necessary together with the needs in order to give adequate program direction. The needs were studied in light of what industrial arts could contribute to them. The Tennessee list of needs was given some attention.

Under the direction of the developed learning needs and in light of the guiding principles used, industrial arts programs were described, in broad outline, for the (1) primary grades, (2) intermediate grades, (3) high school.

Primary grades. Because the child learns rapidly through play, many activities which employ manipulating appropriate industrial materials are incorporated in the play activity. The learning process in these grades is not separated into subject matter areas; thus, learning is a continuous process that tends to employ the total organism. Activities are to be integrated into this learning process and become a part of it.

Intermediate grades. The inclusion of activities of an industrial arts nature becomes more difficult in these grades because the teacher becomes conscious of the dearth of facts and knowledge possessed by the student and makes every effort to eliminate this problem. This results in exclusion of many activities which makes the learning process real. Increasingly complex activities should be encouraged in this age group. This will result in a need for special competence on the part of the staff and additional laboratory space and equipment to meet the needs and problems of the student.

High school. The nature of the high school and its organizational pattern of narrow and specialized subject matter areas does not lend itself favorably to an integrated program having unity and singleness of purpose—the development of an intelligent citizen for an industrial culture. Many difficulties must be overcome and changes need to be made in the present concepts of industrial arts—its content, purpose and methodology. Some of the changes needed within the industrial arts program are:

- Reduction of departmentalization and the unit shop concept.
- 2. Acceptance of the idea that the industrial arts program is an educational program rather than a training program.
- 3. Belief in the idea that the student who experiences great difficulty is a slow learner rather than a "dumbbell."
- 4. Make project selection and development compatible with real problems of the student.
- 5. Integration of learning activities with the activities of other subject areas.
- 6. Increased understanding and use of appropriate guidance principles.

If these things can be viewed under the established learning needs developed from the philosophical treatment and adjustments made toward these beliefs, then industrial arts will be ready to do its part toward making the learning process one that involves the total organism in a unified educational environment.

Microfilm \$3.05; Xerox \$10.60. 236 pages.

AN EVALUATION OF WORD STUDY LESSONS IN GRADE FOUR

(L. C. Card No. Mic 58-7389)

Doris Spencer, Ed.D.
Boston University School of Education, 1958

Chairman: Dr. Donald D. Durrell

The purpose of this study was the construction and evaluation of thirty lessons designed for the inductive teaching of word analysis in grade four. The lessons were intended to produce gains in reading ability, increased vocabulary and independence in word analysis skill.

Words chosen for analysis practice were within the children's speaking vocabulary but beyond the usual vocabularies of primary readers. Each lesson contained between thirty and forty words listed on a card to be grouped under three classifications of meaning. Children analyzed the words inductively rather than by learning rules and exceptions, then wrote the words in the proper category on individual response sheets. Children worked independently in pairs to read the words and classify them under meaningful topics, then used the self-checking key to score their work. They kept daily records of lessons completed and partner's name. The materials replaced the regular spelling period three days weekly for ten weeks.

The experiment was conducted in fourth grades in four Vermont cities. Four hundred twenty-eight children in twenty classrooms, ten experimental and ten control, participated.

The study included the evaluation of ability and achievement as measured by: Kuhlman-Anderson intelligence test, Gates Reading Survey, Boston University Word Pronunciation and Analysis and other standardized and informal measures, in September and December, 1957.

Conclusions

The lessons were effective in producing gains in total reading achievement, word analysis and word recognition. The experimental group showed superior gains at the one percent level of confidence in the following:

- 1. Marked gains resulted in all phases of word analysis and recognition.
 - a. The ability to solve new words with a difference in gain of 14.15 words, critical ratio 4.98.
 - b. Identification of sounds in words with a difference in gain of 12.68, critical ratio 4.12.
 - c. Visual perception of word patterns with a difference in gain of 5.86 words, critical ratio 5.69.
 - d. Identification of homophones with a difference in gain of 8.95 letter combinations, critical ratio 2.58.
 - e. Increase in sight vocabulary with a difference in gain of 5.95 words, critical ratio 3.22.
- 2. These gains were reflected in the improvement of general reading ability. The experimental group was superior at the five percent level of confidence in the following:

- a. Total reading achievement with a difference in gain of .4 grade, critical ratio 2.35.
- b. Reading vocabulary with a difference in gain of .3 grade, critical ratio 2.00.
- c. Speed of reading with a difference in gain of .5 grade, critical ratio 2.08.
- 3. The materials were most effective for pupils whose reading vocabulary and word analysis achievement were above second grade level.
- 4. Affective reactions toward the lessons reported by pupils and teachers were the following: all pupils enjoyed working in pairs, checking answers and keeping record; interest in the materials was high throughout the ten weeks; even the slower readers benefitted from working with a friend and being tutored by a helpful partner; teachers observed improvement in word attack skills and attitude; materials were too easy for a few superior readers and too difficult for the very slow readers.

Microfilm \$2.85; Xerox \$9.80. 220 pages.

A COMPARATIVE STUDY OF SECONDARY SCHOOL SOCIAL STUDIES IN PERU AND CHILE

(L. C. Card No. Mic 59-442)

David Z. Tavel, Ed.D.
Boston University School of Education, 1958

Statement of the Problem

This study consists of an examination of the social studies in the secondary schools of the national systems in Peru and Chile. Its purpose involves identifying existing educational objectives, and examining content and teaching practices in order to determine the extent to which they are leading to them. It also seeks to explain what role has been assigned by these nations to the school as an appropriate function — merely to reflect the existing culture or to effect directed cultural change through education.

Procedure

The procedure followed in this dissertation began with a study of educational and historical material on Latin America. Basic information on objectives, content materials, and instructional procedures was obtained through reference to official documents of the ministries of education. Through personal observation and interrogation this information was supplemented and its reliability evaluated. Comparison was made between information obtained through actual visitations and the data presented by the educational personnel. Conclusions were then drawn regarding (1) consistency between social studies objectives, and content and practices supposedly leading to those objectives, and (2) the role played by the school, through the social studies program, in community improvement. These were employed in formulating a statement of comparison of the nations studied.

Conclusions

The basic organization of the social studies in the secondary schools of Peru and Chile is in terms of individual subjects, even where, as in the experimental school programs in Chile, two or more subjects have been combined. Social studies objectives are largely subjectmatter oriented. Some of them do refer to contemporary problems and deal with various aspects of social life, but this is not done with the explicit purpose of seeking solutions to these problems. Course content is consistent with the objectives, especially with those involving knowledge of events and conditions. But as a result of this consistency the content is composed of subjects rather than social problems which people might approach together in an effort to lessen some of society's more obvious tensions. The absence of formal study of the arts and of science through history and of the Utopian writers of Europe and America results in the concomitant absence in the school program of ideas that might stimulate efforts in behalf of social change. Instructional procedures are directed toward the assimilation of pre-established content and the passive acceptance of values, rather than the development of a critical attitude.

The educational institutions in Peru and Chile thus continue to perform an indirect role, being concerned with transmitting the cultural heritage, rather than taking part in the development of leadership for community improvement.

The schools at present make little difference in the growth of a fuller social conscience relative to conditions needing change and re-direction. The societies in which they exist are beset with problems of illiteracy, ignorance, and low living standards. An aura of hopefulness appears as their educators to an increasing degree are analyzing and evaluating problems of economic conditions and social relationships which are at the root of the tension-ridden conditions in their societies. Other questions such as the role of the family and the role of religion in modifying existing cultural arrangements must be resolved. This involves the creation of an enlightened consensus among the members of these societies. The present social studies program in both countries, as in the United States, is directed toward assimilation of subject-matter rather than development of this needed consensus and melioration of existing social problems.

Microfilm \$3.00; Xerox \$10.20. 229 pages.

A THEORETICAL COMPETENCY PATTERN FOR ELEMENTARY TEACHERS

(L. C. Card No. Mic 58-7605)

Ishmael F. Utley, Ed.D. The University of Tennessee, 1958

Major Professor: A. M. Johnston

The Problem

The problem of this study was the identification of competencies necessary for successful teaching in the

elementary schools. As means of attacking the problem, the following tasks were performed:

- 1. Competencies needed by elementary teachers for quality job performance were described.
- These competencies were assembled into a behavior pattern which revealed the job of elementary teachers in entirety, as reflected in the elements and element relationships which make up a useful Competency Pattern.

Procedures

The following procedures were used:

- 1. A bibliography of the professional literature in the field was compiled.
- 2. Studies related to the Competency Pattern approach to education were reviewed.
- 3. The Competency Pattern approach utilized in this study was described.
- 4. Educational literature establishing the theoretical foundations of the study was reviewed.
- 5. Educational literature analyzing the job of elementary teachers was reviewed.
- 6. The critical tasks necessary for performing the job of teaching in the elementary schools were listed.
- 7. A characterization of task performance in terms of teacher behavior was made.
- 8. A description of the personal equipment (special know-how) needed by elementary teachers in the performance of the postulated critical tasks was developed.
- 9. The criteria, comprehensiveness, consistency, and workability were applied.

Conclusions

- 1. There is evidence to support the position that a Competency Pattern for elementary teachers can be developed through an analysis of professional literature and information pertaining to the Competency Pattern Concept, democratic and educational theory, and the job of elementary teachers.
- 2. The hypothesis that the competencies needed by elementary teachers for quality job performance can

- be theoretically identified, has apparently been substantiated.
- 3. The hypothesis that competencies can be arranged into a meaningful pattern has been supported inasmuch as competencies were portrayed in terms of theory, critical tasks, and know-how.
- 4. The notion that the Competency Pattern should indicate the method of task performance has been established.
- 5. The concept that the Competency Pattern should satisfy the basic criteria of comprehensiveness, consistency, and workability has been substantiated.
- 6. In the process of comparing different ways that competencies were stated in various other studies, it was concluded that competencies relating to job performance may be better understood if presented as a behavior pattern.

Implications for Pattern Usage

- 1. Although this Competency Pattern for elementary teachers has not been functionally tested, the pattern should serve as a supplement to and extension of other research efforts relating to teacher competency. However, additional research is needed: (a) to test this pattern in operation; and (b) to develop patterns using other theoretical assumptions.
- 2. This Competency Pattern should serve as a guide for elementary teachers in job performance and as an instrument for the evaluation of present teacher practice.
- 3. This Competency Pattern should aid elementary teachers in the development of individual competency patterns and in examining their value systems.
- 4. This Competency Pattern should serve as a manual for the in-service education of elementary teachers.
- 5. This Competency Pattern should serve as a guide for developing and evaluating teacher education programs and as a basis for the certification of elementary teachers.
- 6. This Competency Pattern could very well be used as a basis for constructing a variety of rating devices to be in programs of merit rating of elementary teachers.

Microfilm \$5.45; Xerox \$19.40. 426 pages.

ENGINEERING

ENGINEERING, GENERAL

THE RELATIONSHIP BETWEEN TIME STUDY PACE RATING AND JOB DIFFICULTY

(L. C. Card No. Mic 58-7972)

Carroll Blake Gambrell, Jr., Ph.D. Purdue University, 1958

Major Professor: Harold T. Amrine

The rating phase of time study has been controversial over the years, primarily because of its subjective nature. The objective rating of operator performance is desirable because it will reduce or even eliminate subjectivity in rating.

A system of objective rating exists which requires the analyst to rate the operator's pace and then make an adjustment for the difficulty of the job. This procedure assumes that pace rating can be done independently of job difficulty. An experiment was designed for the purpose of testing the hypothesis that: RATINGS MADE BY SKILLED, THOROUGHLY TRAINED, AND PRACTICING TIME STUDY ANALYSTS USING PACE RATING ARE NOT INFLUENCED BY JOB DIFFICULTY.

The data were collected in the field from practicing time study analysts and subjected to rigorous statistical analysis. As a result of this analysis, the hypothesis was rejected because the analysts used could not completely avoid the influence of job difficulty in their rating of pace.

The job difficulty factors investigated were: (1) weight, (2) size and (3) amount of body used. Each of these factors was found to have an influence on the pace ratings of some analysts. This influence was found to be statistically significant at the 1% significance level. The analysts who participated in the experiment were found to vary in their ability to rate pace. This variance was found to be significantly different at the 1% significance level. The experiment also showed that interaction effects of these independent job difficulty factors can influence pace ratings.

Microfilm \$2.05; Xerox \$7.40. 156 pages.

THE POZZOLANIC ACTIVITY OF CERTAIN FLY ASHES AND SOIL MINERALS

(L. C. Card No. Mic 58-7561)

Roy Junior Leonard, Ph.D. Iowa State College, 1958

Supervisor: D. T. Davidson

The pozzolanic activities of six fly ash samples, representing the normal variations found with this material, and five mineral samples, quartz, albite, anorthite, andesine

and orthoclase, which represent the common non-clay minerals found in soils, were investigated. An electro-conductivity procedure was used to trace the reaction between the samples and calcium hydroxide in solution at various temperatures. The fly ashes exhibited varying degrees of pozzolanic activity depending upon the amount of reactive material present, its specific surface and the temperature at which the reaction took place. The mineral samples exhibited little activity at low temperatures, but at temperatures above 60° C. their activity was increased considerably. This may be due to a change in phase of the reaction product that takes place between 60° and 80° C.

The reaction products of the pozzolanic reaction were investigated by means of x-ray diffraction and differential thermal analysis procedures. X-ray diffraction patterns were obtained for a reaction product of fly ashes immersed in calcium hydroxide solutions for 365 days. DTA curves of these samples also indicated a reaction product. The reaction product is thought to be calcium silicate hydrate (I), a reaction product frequently observed in set portland cement pastes. This crystalline reaction product may be a secondary reaction product since it was not observed in samples tested shortly after the reaction had taken place. The crystalline reaction product could be formed from a gel.

The pozzolanic activity of the materials tested was found to be limited by the rate of diffusion of calcium through the reaction products which form on the surface of the pozzolanic material after reactions have taken place. The rate of diffusion was to increase with temperature and concentration. The relationship between concentration and diffusion could not be determined exactly since only two different concentrations were used; however, the trend was for the rate of diffusion to increase with concentration.

Microfilm \$2.10; Xerox \$7.40. 160 pages.

THE EFFECT OF HEATER SURFACE GRAIN SIZE ON NUCLEATE POOL BOILING

(L. C. Card No. Mic 58-7999)

Charles Bainbridge Wooldridge, Ph.D. Purdue University, 1958

Major Professor: Richard J. Grosh

The effect of heater grain size on the heat transfer coefficient in nucleate boiling was studied using a small platinum wire heater immersed in ethyl alcohol at saturation temperature and atmospheric pressure. Wires from the same spool of highest purity platinum were used for each of 29 tests. Two to three runs (cycles) were completed for each test. Wires used in the tests were either in the condition as received, annealed in air, annealed in a vacuum, or annealed and etched; all treatments were found to

influence grain size or boundaries. The heat transfer coefficient increased with decreasing grain size and also with roughness. The results were reproducible.

Before each test, the wire was energized until the resistance and current were observed to remain essentially constant for several hours. This was an attempt to minimize the initial effects of adsorbed gases, and gases dissolved in the liquid if any such gases remained after the bath heating period. In order to minimize the possibility of changing the wire surface after the start of a test, the wire temperature was, except in three cases, kept under that which would give the peak heat flux.

Fourteen wires were electrically annealed in air at temperatures varying from 1100°C to 1450°C. For the airannealed wires the number of grains varied from 1 to 39 in the cross section at the longitudinal center of the wires. Eleven wires were annealed at temperatures varying from 1310°C to 1545°C in a vacuum of approximately 0.01 to 0.02 microns of mercury pressure. The only two wires in this series which exhibited a noticeable increase in grain size were two for which the annealing current was turned on when the vacuum was 110 to 150 microns but was proceeding to 0.02 microns. These two wires each had a single grain in the cross section. Three wires were etched and recleaned before testing. Pictures of the surface and cross section of selected wires were taken.

The results were portrayed in the form of graphs showing the heat transfer coefficient plotted against the difference between the wire temperature and the liquid bulk temperature at saturation. The temperature difference required to sustain nucleate boiling for air-annealed wires containing a single grain in the cross section was two to three times that required for air-annealed wires containing 33 grains in the cross section. A discontinuity in the boiling curve such as reported by Van Camp (49) was observed. One single-grained air-annealed wire when energized produced free convection only, up to a temperature difference of 134°F between the wire and liquid. At this temperature, film boiling spontaneously erupted over the entire wire. The same result was observed with an unannealed wire having 34 grains and an annealed etchedwire having 39 grains in their cross sections, at temperature differences of 118 and 124°F respectively.

Etching 20 seconds in an aqueous solution of 5% potassium cyanide before a test increased roughness and decreased the temperature difference required to sustain nucleate boiling for both air-annealed and vacuum-annealed wires. The etched wire was the only one of the vacuum annealed series that was capable of sustaining superheat of more than a few degrees.

The results for the vacuum-annealed wires were deemed inconclusive due to the possibility of contamination from the oil vapor in the oil diffusion pump. The results for the vacuum-annealed wires, however, definitely indicate that for the wires used, two different surface conditions existed such that one produced higher heat transfer coefficients at low temperature differences of wire and liquid and the other produced higher heat transfer coefficients at high temperature differences.

To repeat one of the most important results: tests on the air-annealed wires indicate that the longer the length of the grain boundaries the higher is the heat transfer coefficient for a given wire-liquid temperature difference.

Microfilm \$2.20; Xerox \$7.80. 167 pages.

ENGINEERING, AERONAUTICAL

SHOCK INDUCED UNSTEADY LAMINAR COMPRESSIBLE BOUNDARY LAYERS ON A SEMI-INFINITE FLAT PLATE

(L. C. Card No. Mic 58-7857)

Sau-Hai Lam, Ph.D. Princeton University, 1958

The physical problem under study in this dissertation is the shock induced two-dimensional unsteady laminar compressible boundary layer on a semi-infinite flat plate. The shock is considered to have constant strength and it advances into a quiescent gas. The flat plate is at zero incidence and is at rest.

The Prandtl boundary layer approximation is adopted. This class of unsteady laminar boundary layers has the peculiar feature that it possesses at any instant two streamwise boundary conditions. In other words, at any instant the boundary layer must have zero thickness at both the leading edge and at the shock. This is at variance with the conventional formulation of boundary-value problems for steady boundary layer equations, where only one "upstream" condition is allowed.

The Crocco variables are used throughout the analysis with shear function $\mu \frac{\partial \mu}{\partial \mathcal{Y}}$ and enthalpy \mathcal{K} as the dependent variables and $\alpha = \frac{\mathbf{X}}{\mu_0 t}$, $\beta = \frac{\mu}{\mu_0}$ and $\gamma = \frac{\mu_0^2 t}{\nu_0}$ as the independent variables. Rigorous uniqueness theorems for the simple case of $\rho\mu$ = constant are given for both the shear and enthalpy solutions under certain sufficient conditions. These uniqueness theorems demonstrate the capability of the unsteady boundary layer equations to admit two streamwise boundary conditions and also provide a basis upon which to correctly formulate boundary-value problems.

The region of interest is divided into two parts, namely, the \mathcal{M} region and the interaction region. The \mathcal{M} region extends from the shock ($\alpha = A$) to the line $\alpha = 1$ for $0 \le \beta \le 1$ and $\gamma \geqslant 0$; and the interaction region extends from the line $\alpha = 1$ to the leading edge ($\alpha = 0$ for $0 \le \beta \le 1$ and $\gamma \geqslant 0$. The shear solution $\mu \frac{\partial \mu}{\partial \gamma}(\alpha, \beta, \gamma)$ in the \mathcal{M} region is shown to satisfy all the sufficient conditions stated in the uniqueness theorem, and is therefore unique. A simple approximate formula is derived to relate skin friction and shock strength in this region. Qualitative sketch of streamline pattern in the (α, β) plane for the whole region of interest is presented.

A positive lower bound and positive upper bound were established for the shear function over the whole region of interest (when $\rho\mu = \rho\mu(\beta)$ or $\rho\mu$ = constant). Its properties are discussed on the basis of a refined momentum integral solution and on a simple linearized analysis. The "singular" parabolic nature of the problem is emphasized. A method of numerical iteration is suggested and sample calculations for the shear solution for the case of zero shock strength and $\rho\mu$ = constant are presented.

Although most results were obtained under the assumption of $\rho\mu=\rho\mu(\beta)$ or $\rho\mu=$ constant, it is believed that a more realistic choice of viscosity law and value of Prandtl number will not greatly affect the general properties of the solutions. The numerical iteration method suggested should be capable of handling arbitrary viscosity law and arbitrary but constant Prandtl number.

Microfilm \$2.00; Xerox \$6.60. 138 pages.

ENGINEERING, CHEMICAL

CO-CURRENT GAS ABSORPTION

(L. C. Card No. Mic 58-7968)

Daniel Edward Collins, Ph.D. Purdue University, 1958

Major Professor: W. H. Tucker

This work was carried out in order to study primarily the absorption of carbon dioxide in a wetted-wall column using co-current flow. In addition the absorption in counter-current flow was also investigated, and the average thicknesses of the liquid films were measured under the same experimental conditions.

The work was done in two 2-inch diameter glass columns, 3" and 36" long, whose only unique feature was a liquid collector section of special design. The film thickness was measured photometrically with corrections made for light loss at the liquid surface.

The flow rates covered were from zero gas flow to a Reynolds number of about 92,000 in parallel flow, and to Reynolds numbers as high as about 40,000 in counter-current flow. The measurements were made at liquid Reynolds numbers (based on the film thickness) of 240, 410, 920, 12500, 1700, and in the case of the film thickness runs also at 2100.

It was found that the use of parallel flow greatly increased the operating range possible before the conditions in the column became unstable, and that it produced appreciably higher transfer coefficients than in the case of counter-current flow. It was also found that the presence of a surface-agent had a marked effect both on the film thickness and on the absorption coefficient.

The various mechanisms of transfer present in the falling film were discussed, and it was decided that the flow could be divided into five separate classes of flow, depending on the relative magnitude of the liquid flow rate, the presence of surface disturbances in the film, and the amount of interfacial shear. Because of this difference in flow over the experimental range, several different expressions were used to predict the coefficients. It was found that the usual laminar and turbulent flow formulas gave results considerably lower than the experimental values, as did an expression based on a Reynolds-type analogy applied to the gas phase. A Reynolds-type analogy based on the liquid film only gave coefficients several times greater than experimental. The results of all relations were shown in comparison to the experimental results.

Expressions for predicting the film thickness were derived based on the assumptions of a laminar or Universal velocity profile in the liquid film. These expressions gave values about 10% higher than the experimental results. The average film thickness results for single-phase flow were found to agree with other investigations and with the theoretically predicted values. The thicknesses were correlated empirically by means of the expression

$$m = Const. (f)^{-1/5} (Re_g)^{-2/5} (Re_1)^{2/5}$$

Fanning Friction Factors were calculated and plotted for parallel and counter-current flow with pure water and with water containing a small amount of surface agent. These factors were used for the above-mentioned film thickness and absorption coefficient predictions.

A flow model was derived which made possible the use of the photometric technique with light absorption by both liquid films, as opposed to the use of a single film which had been previously required.

The magnitude of the "starting length" was also roughly measured, and these results compared with those of other investigators. Microfilm \$2.65; Xerox \$9.20. 203 pages.

EFFECT OF NITROGEN ON THE DEFORMATION OF MAGNESIUM SINGLE CRYSTALS

(L. C. Card No. Mic 58-1778)

Doyle Geiselman, Ph.D. Purdue University, 1958

Major Professor: Dr. Albert G. Guy

The object of the present research was to study the effects of nitrogen on the deformation of magnesium single crystals with special emphasis on the phenomenon of discontinuous yielding.

The crystals were tested in tension using an Instron tensile testing machine which gave a constant strain rate of approximately 1.2 x 10⁻⁴ sec.⁻¹. The majority of the tests were at room temperature and 200°C with a few tests at other temperatures from -195 to 300°C.

The alloys studied were made from sublimed magnesium and contained 0.0008 to 0.0048 W/o nitrogen. The maximum solid solubility of nitrogen in equilibrium with magnesium nitride was estimated to be 0.0048 W/o.

A sharp yield point was found only after solution treating the crystals at 400° C or above, quenching them in oleum spirits from the solution temperature, and aging them. The yield point appeared concurrently with a sharp increase in the aging index, S_a - S_s . (The aging index was defined as the difference between the strength of the aged crystal, S_a , and that of the solution-treated crystal, S_s .) When the crystals were repeatedly aged and tested the yield point disappeared. However, a longer time was needed to eliminate the yield point when the crystal was not deformed during the aging period. This behavior was consistent with the fact that magnesium forms a stable nitride which could remove the nitrogen from solution and eliminate the yield point.

The strength of slowly cooled crystals was not affected by a difference in nitrogen content, but the strength of solution treated crystals increased with an increase in nitrogen content.

Other results obtained from this research were: (1) The strength of magnesium single crystals decreased with an increase in temperature. Other investigators did not detect a decrease above room temperature because of the scatter among crystals. (2) The crystals recovered completely from shear hardening caused by basal slip in 30 minutes at 200°C. Hardening from other causes, however, was not annealed out at even higher temperatures.

The results were analyzed using Cottrell's theory of solution hardening. Cottrell's equation for the maximum binding energy of a solute at the critical temperature,

 $V_{\text{max}} = k T_0 \ln 1/C_0$

gave a value for nitrogen in magnesium greater than 0.55 ev.

However, Bilby's equation, $V = 4mber^3$ (sin α/R), gave 0.39 ev for the maximum binding energy.

It was shown that all magnesium may contain sufficient nitrogen to affect the results of other studies on pure magnesium. Nitrogen might also have a similar effect in other materials which form stable nitrides, e.g., aluminum. The results of a recent study of quenched aluminum crystals were discussed from this point of view.

Microfilm \$2.00; Xerox \$5.80. 117 pages.

THE EFFECT OF FLUIDIZATION ON THE CATALYTIC CRACKING OF CUMENE

(L. C. Card No. Mic 59-856)

Albert Gomezplata, Ph.D. Rensselaer Polytechnic Institute, 1958

The effect of uniformity of fluidization on the catalytic cracking of cumene was studied for 1.5, 3, 5, and 8 inch beds, at superficial velocities of 0.06 to 0.24 feet per second, in a 3 inch diameter reactor operated at 800°F. A silica-alumina catalyst was used. The percent conversion in a fluidized bed was found to be lower than in a fixed bed, and to be dependent on the type of catalyst support used. A porous plate support was up to 30% more efficient than a screen support, which is attributed to its better gas distribution characteristics, and to its ability to introduce the discontinuous phase as smaller gas bubbles.

Indications are that the first few inches of the bed are very effective in bringing in contact the continuous and the discontinuous phase, and therefore, most of the conversion due to the interaction of the two phases takes place here. This can be explained in terms of the rapid growth of gas

bubbles as they proceed through the bed.

A pressure fluctuation study was made in an attempt to study the effect of bed uniformity on conversion, but it was found impossible to isolate the pressure fluctuations of the bed from those in the rest of the system. An electrical network was developed to analyse pressure fluctuation data quicker and more easily than has been possible before. The method can be adapted to analyse other types of fluctuations.

Data from a separate study of the pressure fluctuations in a plastic column, similar in design to the reactor used for the kinetic study, showed that although different trends in pressure deviation could be observed between a screen and a porous plate distributor, no similarity with the conversion obtained in the kinetic study was evident.

Microfilm \$2.00; Xerox \$5.80. 116 pages.

A STUDY OF FORCED CONVECTION MASS TRANSFER IN THE REGION SURROUNDING A SPHERE

(L. C. Card No. Mic 59-711)

Richard McDonald Griffith, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor Robert Byron Bird

Both an empirical and a theoretical examination of forced convection mass transfer in the region surrounding

a sphere are described in this thesis. Among the results of this study are formulas and graphs by which:

- the mass transfer coefficient for the region surrounding a sphere can be calculated from more easily measured quantities;
- (2) local velocities in the entrance region of a cylindrical duct can be calculated from the properties of the fluid within the duct, the diameter of the duct, and the average velocity through the duct;
- (3) physical properties of many binary solutions can be calculated from the temperature and/or composition of each solution.

Those formulas applying to mass transfer provide coefficients for both spheres with and without surface flow and for types of fluid flow about the sphere ranging from creeping to potential flow. These formulas show that surface flow increases the values of mass transfer coefficients... with the increase being, perhaps, manyfold for transfer through highly viscous fluid.

Unfortunately formulas for mass transfer coefficients were found only for spheres either free from interfacial tension gradients or having a large enough gradient to prevent all surface flow. It was shown that interfacial tension gradients, which act as pressures parallel to and existing in the surface, oppose the viscous shear on the sphere surface and hinder surface flow. This action is reflected by a reduction in mass transfer rates.

All formulas for mass transfer coefficients were empirically checked except those for creeping flow about the sphere. The graphs of experimental data deviated from theoretically predicted values slightly; however, this discrepancy was eliminated by small changes in the graph from which surface velocity is determined.

In mass transfer experiments liquid flowed past a suspended drop or bubble. The globule was formed on the end of a fine, glass capillary through which, usually, additional fluid was fed to balance the loss by mass transfer. The mass transfer coefficient could be determined from the surface area of the globule and the fluid feed rate to the globule. By saturating the globule with the liquid flowing past it, mass transfer within the globule was eliminated; hence the coefficient measured described transfer only outside the globule. Feeding fluid into the globule did not noticeably influence mass transfer rates.

Surface active matter was added to drop fluid in some runs to produce interfacial tension gradients capable of preventing surface flow. The data from these runs supplied mass transfer coefficients for rigid spheres. Inruns with bubbles sufficient surface active matter was naturally present in surrounding liquid to prevent surface flow. Data was also obtained from runs where interfacial tension gradients hindered but did not prevent surface flow.

Globules were suspended in the entrance region of ducts with circular cross section. There a much broader region of uniform velocity about the globule could be obtained than farther downstream. Velocities within the two ducts used were determined from the motion of trace particles; thus either tellurium traces of velocity profiles were photographed or colloidal impurities in the flowing liquid were viewed through an ultramicroscope. Both methods were capable of giving values accurate to one percent. The geometries of the flow systems preceding the two ducts examined differed; consequently individual dimensionless graphs were required to correlate measured velocities.

Among the physical properties measured were: densities, viscosities, mutual solubilities, interfacial tensions, and diffusivities. These properties are for binary solutions of several alcohols and acetates in water and for water in isobutanol.

Microfilm \$3.40; Xerox \$11.60. 261 pages.

PART I: POLARIZATION CAPACITANCE
MEASUREMENTS ON ZIRCONIUM.

PART II: EFFECTS OF GAMMA IRRADIATION ON
THE VISCOSITY OF ORGANIC COMPOUNDS

(L. C. Card No. Mic 58-2769)

Alfred Burtron Johnson, Jr., Ph.D. University of Utah, 1958

Chairman: Dr. George Richard Hill

Part I:

The polarization capacitance of zirconium has been measured, using the method of Wagner; a ballistic galvanometer was used to measure the charge which flows to the metal-solution interface when an instantaneous potential is impressed.

The capacitance of zirconium which had been etched or sanded increased immediately after treatment and then decreased on aging and became asymptotic to the capacitance measured prior to treatment.

The capacitance value prior to etching or abrading was about 2.5 uf/cm², but was found to change with initial potential, temperature, potassium chloride concentration and solvent.

The observed capacitance effects are explained in terms of double layer effects at an oxide film on the zirconium surface, which acts as the dielectric of a capacitor. The film could account for the low capacitance value for zirconium; removal and subsequent regrowth of the film would explain the capacitance-time curves for abraded or chemically-polished zirconium.

Extrapolation of the capacitance-time curves to zero time gave a value of about 30 uf/cm² which should correspond to the capacitance of the film-free metal surface. Correlations of the capacitance value for samples which had not been etched or abraded with the data of Charlesby indicated a film thickness of about 38 Å, which is in the range reported for thin films on other metals.

Other measurements show that the capacitance method indicates relative changes in surface area for zirconium; true surface areas might be determined by comparison of the extrapolated value of the zirconium capacitance with the capacitance of mercury as an ideally-smooth surface, but the reliability of the method is questionable.

Observations of overvoltage effects and potential-time curves for zirconium against platinum and calomel electrodes are shown.

Part II:

Changes in viscosity due to gamma irradiation have been measured for hexadecane, hexadecene, hexadecanol, glycerol, paraffin and Uintah Basin waxes, and polyethylenewax solutions. Dosages used in the study were 10×10^6 to 36×10^6 rep.

In all cases, the viscosity increased under irradiation; the increases were largest for hexadecene, glycerol and the polyethylene-wax solutions.

The study indicated that the viscosity increase for hexadecene is directly proportional to dosage.

Activation energies and entropies for viscous flow were calculated for several of the compounds.

Mass spectrometer analysis of the product gases from the irradiation of hexadecane, hexadecene and hexadecanol showed the major component to be hydrogen. In all cases, the hydrogen percentage was 90% or greater; hydrocarbon gases, CO, CO₂ and H₂O were the other gaseous compo-

Infrared analyses of hexadecane and hexadecene indicated the formation of trans-vinylene unsaturation under irradiation in both cases.

Microfilm \$2.00; Xerox \$6.60. 138 pages.

AXIAL MIXING OF BINARY GAS MIXTURES FLOWING IN A RANDOM BED OF SPHERES

(L. C. Card No. Mic 58-7866)

Keith W. McHenry, Jr., Ph.D. Princeton University, 1958

Measurements are reported on axial mixing of binary gas mixtures at room temperature and atmospheric pressure in a random bed of spherical particles. Using the Fick's Law equation for diffusion an axial Peclet number, d_PU/E_z , (where d_P is particle diameter, U is interstitial velocity, and Ez is axial eddy diffusivity) was computed in terms of the ratio of the amplitudes of a sinusoidal concentration wave at the inlet and outlet of the bed. An experimental method was devised to eliminate end effects in the system. For the gas systems H_2-N_2 and $C_2H_4-N_2$ and for Reynolds number $(\!\frac{d_{\rm P}G_o}{\mu}\!)$ between 100 and 400 the mean of 21 determinations of axial Peclet number was 1.88 + 0.15. This value compares favorably with a value of 2.0 predicted theoretically on the assumption that the bedacts as a series of n perfect mixers, where n is the number of particles traversed between inlet and outlet.

Axial diffusivity for turbulent flow of gases among particles is about six-fold larger than radial diffusivity, previously determined. It is suggested that axial diffusivity may not, perhaps, be neglected in contacting devices, such as adsorbers and catalytic reactors.

Microfilm \$2.00; Xerox \$6.60. 138 pages.

DROP SIZE DISTRIBUTIONS FROM CENTRIFUGAL SPRAY NOZZLES

(L. C. Card No. Mic 59-673)

Paul A. Nelson, Ph.D. Northwestern University, 1958

Adviser: William F. Stevens

The objective of this investigation was to obtain an insight into the mechanism of liquid break-up from centrifugal

pressure nozzles at intermediate pressure levels of 100 to 1500 psi. From theoretical considerations, atomization from centrifugal nozzles appears to be a function of the flow characteristics of the liquid as it leaves the nozzle and independent of the gas medium into which the liquid is sprayed. The flow conditions of the liquid leaving the nozzle can be defined by variables which do not include any nozzle dimension except the orifice diameter on the assumption that all flow peculiarities due to the nozzle design are damped out by the high turbulence in the flow through the orifice.

With this basic assumption, the air core diameter data of other investigators for grooved-core centrifugal nozzles were correlated by dimensional analysis. For Reynolds numbers above 10,000, the air core-to-orifice-diameter ratio appeared to be a function of the spray cone angle only.

Extensive atomization data were obtained in this investigation by freezing the entire spray in a specially built collector which was cooled by liquid nitrogen. The dropsize distributions obtained by screening the frozen particles fit the square-root-normal frequency function.

The volume median drop diameter was correlated with dimensionless groups determined by dimensional analysis. The data for all of the runs except those in which water was sprayed were plotted on a single graph with an average deviation of 8.25 per cent from the curve of best fit. This included a total of ninety-seven runs, performed with six organic liquids (range of variables: density, four fold; surface tension, two fold; viscosity, nine fold) with nineteen different nozzles, and over the pressure range, 100 to 1500 psig. The drop-size data for water could not be correlated with the organic data but it agreed well with the data for water of W. H. Darnell (Ph.D. Thesis, Univ. of Wisconsin, 1953) when plotted in a manner similar to that used for the organic liquids.

The square-root-normal standard deviation was correlated for all of the data (organic liquids and water) with dimensionless groups. The average deviation of the data from the curve of best fit was 13.0 per cent.

The fact that the data could be correlated quite well was considered to be evidence that the variables which were chosen adequately define or dictate the drop-size distribution. It is true that the correlations were based on data for one type of nozzle, the grooved-core type. But the variables used in the correlations were properties of the spray rather than properties related to specific types of nozzles. Therefore, the correlation curves might be applicable to other types of centrifugal, hollow cone nozzles.

Microfilm \$2.00; Xerox \$5.40. 110 pages.

PREFLAME OXIDATION AND DETONATION OF ISOOCTANE AND DISOBUTYLENE

(L. C. Card No. Mic 59-674)

Charles Henry Smith, Ph.D. Northwestern University, 1958

Supervisor: George G. Lamb

A general theory of combustion is difficult to conceive due to the complexity of the phenomenon; thus a large number of investigations both experimental and theoretical have been undertaken to determine its mechanism. This work does not include investigations of a purely chemical nature but brings forth methods of studying the combustion phenomenon of a homogeneous fuel-air mixture experimentally and the interpretations of experimental data in the light of recent theoretical developments.

The data were obtained with the aid of a rapid compression machine developed by Taylor, Leary, et al for two fuels, isooctane (2, 2, 4-trimethylpentane) and diisobutylene (2, 4, 4-trimethylpen--tene--1). The equivalence ratios used were two thirds (2/3), one (1), and one and a quarter (1.25). The pressure in the combustion chamber versus time was obtained by photographing the sweep produced in an oscillograph whose vertical input was connected to a pressure pickup located at the wall of the chamber and whose horizontal input was connected to a time marker which marks every one thousandth of a second.

Delay times were correlated as a function of induction period temperatures and pressures by a method proposed by Walsh and Frank--Kamenetskii which yielded the following equations:

for isooctane
$$\mathcal{T} = 3660 \text{ P}_o^{-1} \text{T}_o^{-\frac{1}{2}} \exp \left[1/\text{T}_o (3378-0.73 \text{ X } 10^{-4} \text{QT}_o^{1.2}/\text{c}) \right]$$
 for diisobutylene
$$\mathcal{T} = 4.55 \text{ X } 10^4 \text{P}_o^{-1} \text{T}_o^{-\frac{1}{2}} \exp \left[1/\text{T}_o (1805 - 1.08 \text{ X } 10^{-4} \text{QT}_o^{1.2}/\text{c}) \right]$$

where τ = delay time (interval between the completion of compression and incipient explosion), milliseconds, P_o = initial pressure after compression, psia, T_o = initial temperature after compression, ${}^{0}K_{,}Q$ = constant volume heat of reaction, cal/gm. mole, and c is the constant volume specific heat of product gases, cal./gm.mole - ${}^{0}K_{,}$

The induction temperature and pressure ranges were approximately 740 -- 1020°K and 220-480 psia respectively for both hydrocarbons and the above two equations were found to fit the data throughout the entire range of temperature, pressure, and equivalence ratio investigated.

The mechanism proposed by Frank-Kamenetskii was used to describe the kinetics of the oxidation reaction. This mechanism suggests the following equation for the rate of reaction:

$$r = A' \exp B'\theta$$

where r = rate of reaction, gm. moles/cm³-sec, $\theta = time$, milliseconds, and A' and B' = variables dependent upon pressure, temperature, and composition, with units similar to those of r and θ . The following relationships were obtained:

for isooctane
$$r = 62.75 \times 10^{-5} \phi^{1.8} P^{1.27} exp \left[-1/T (981 - 91T \theta P^{-1} exp \left\{ -1000/T \right\} + 4.08 \times 10^{-4} Q T^{1.2}/c) \right]$$
 for dissobutylene
$$r = 2.98 \times 10^{-5} \phi^{0.5} P^{1.27} exp \left[-1/T (843 - 67T \theta P^{-1} exp \left\{ -1000/T \right\} + 0.96 \times 10^{-4} Q T^{1.2}/c) \right]$$

The temperature and pressure ranges were from those of the induction conditions to approximately 3000°K and 1475 psia, respectively.

Microfilm \$2.00; Xerox \$5.20. 105 pages.

ENGINEERING, CIVIL

FACTORS AFFECTING EVAPORATION FROM SOILS IN CONTACT WITH A WATER TABLE

(L. C. Card No. Mic 58-2822)

Richard August Schleusener, Ph.D. Colorado State University, 1958

Evaporation studies were conducted in a controlledatmosphere chamber on three soil types in contact with a water table. The purpose was to establish the effects on evaporation of water-table depth and the ambient factors of temperature, humidity, wind motion, and radiation. A free-water surface was used as a control.

The ambient variables produced approximately the same effect on evaporation from the soils as on evaporation from the free-water surface for water-table depths in soils less than about 12 inches. For greater depths the ambient variables had a lesser effect on evaporation from soils than from the free-water surface.

Experimental data indicate the existence of limiting conditions of water-table depth and/or evaporating conditions beyond which a further increase in evaporation rate from a free-water surface produces a decreased evaporation rate from the soil. Hysteresis effects are suggested as a cause of this phenomenon. A method based on limited data is presented for estimating these limiting conditions.

Microfilm \$2.00; Xerox \$7.00. 147 pages.

ENGINEERING, ELECTRICAL

THE ELECTRICAL NOISE OF REVERSE BIAS BREAKDOWN IN SILICON P-N JUNCTIONS

(L. C. Card No. Mic 58-7394)

Keith Schaffner Champlin, Ph.D. University of Minnesota, 1958

Adviser: A. van der Ziel

From a series of measurements performed on silicon alloy junction diodes with breakdown voltages in the range from seven to ten volts, it is concluded that the high noise level encountered in the reverse bias breakdown region is caused by spontaneous fluctuations between stable current levels. For some diodes, a single breakdown path (microplasma) is bistable and may be represented by a randomly fluctuating "on-off" switch. Other diodes exhibit multistable behavior. For these diodes, a single breakdown re-

gion appears to resemble a multiple position random switch where the transition probabilities to the next higher current are fixed but the transition probabilities to the next lower current are a sensitive function of applied voltage.

The general formula for the spectral intensity of multistable current noise is derived. This formula is found to reduce to Machlup's formula for the special case of bistable fluctuations. It is shown that a multistable breakdown region can be approximated by a bistable switch under certain circumstances. Formulae for the dc current and ac small signal admittance of a bistable switch are then derived.

The low frequency current spectral intensity of a diode exhibiting multistable behavior is seen to oscillate between maxima and minima as dc current is increased. Using a bistable approximation, excellent agreement is found between theory and experiment for the first noise peak by assuming that the average "off" time is 2×10^{-6} seconds independent of current. By extending the use of the noise formula for the bistable approximation to the other noise peaks, time constants of the order of 10^{-10} seconds are detected.

With the diode connected to a high impedence source, voltage pulses distributed in magnitude and starting time are observed at dc currents below $300~\mu a$. Formulae for the pulse repetition rate, average pulse length, and pulse height distribution are derived by assuming that the statistical problem is the same as for current noise in a low impedance circuit. This assumption is found to be incorrect since the probability for reconduction is seen to be strongly voltage dependent. As a consequence, the spectral intensity of the current noise in a low impedance circuit and the spectral intensity of the voltage noise in a high impedance circuit are not related by simple formulae.

Zener emission is found to be the principal source of the carriers which initiate breakdown in a diode with breakdown voltage of 9.4 volts.

Rose's mechanism of microplasma formation in a p-intrinsic-n structure is extended to include step junctions. Two physical models leading to multistable conduction are discussed. Microfilm \$2.00; Xerox \$5.00. 100 pages.

A STUDY OF NONLINEAR SERVOMECHANISMS

(L. C. Card No. Mic 58-727)

Robert Lien Cosgriff, Ph.D. The Ohio State University, 1953

The linear techniques commonly used in the design and synthesis of servomechanisms are only marginally satisfactory for conventional servo systems and are completely invalid for special computing and recording servo systems such as logarithmic and square root recorders. The purpose of the dissertation is to extend and improve conventional methods of analysis and to develop new methods which are valid for determining the performance of nonlinear servomechanisms. The material in the dissertation has been broken down into three main divisions.

In the first division, the response characteristics of nonlinear systems are determined for the condition of operation where the variations of the system variables from their equilibrium states are very small. The small signal response of the nonlinear system is determined by expanding the nonlinear terms in the system equation in a power series about the equilibrium condition and neglecting all but the linear terms. The linear equation so obtained can then be handled by conventional linear methods. This small signal theory is used to illustrate the behavior of typical nonlinear systems in the neighborhood of the equilibrium state. Design procedures are developed which insure an acceptable small signal response about any equilibrium state except in the neighborhood of certain isolated equilibrium points. The design methods are illustrated for servo systems whose output approximates a nonlinear function such as the logarithm of the input signal.

In the second main division, the problem of determining the response of nonlinear systems is considered for the condition of operation where the deviations of the system variables from their equilibrium states are large. The concepts, terminology, and special phenomena that occur in nonlinear systems for this type of operation are introduced by a review of phase plane methods. Several methods proposed for nonlinear compensation of servomechanisms are also discussed in this part of the dissertation.

Since phase plane techniques can be applied conveniently only to the study of second order differential equations, approximate methods for determining the behavior of nonlinear systems by means of frequency response techniques are developed. The frequency response techniques depend on the concept of nonlinear gain. This concept, which expresses the relationship between the input and output sinusoidal frequency components of a nonlinear system, is convenient for investigating the properties of a system operating in a limit cycle condition. The approximate frequency of oscillation, the amplitudes of the fundamental, a limited number of the harmonic components, and the phase of these harmonics with respect to the fundamental can be determined.

A means for representing the open-loop frequency response data of a nonlinear system is also introduced in this part of the dissertation. This representation is used to determine the equilibrium stability, possible limit cycles and response hysteresis as well as the steady-state frequency response of the closed-loop system. The representation for the open-loop frequency response has been defined so that the response characteristics of a nonlinear, closed-loop system with a linear filter in the error path can be determined by using only the open-loop frequency response of the system without the filter, and the transfer function of the filter.

Analytical methods for determining the open-loop frequency response of systems are considered. In this study, the concept of "maximum sinusoidal output" is introduced and discussed. The term "maximum sinusoidal output" is defined as the largest sinusoidal output that can be produced in the output of a physical nonlinear device. Also the behavior of a system with response hysteresis is discussed. Finally, frequency response techniques are used for investigating subharmonic response.

The third main division of the dissertation is concerned with some of the broader aspects of system performance. In this last division the use of universal curves is suggested as an aid in the design of nonlinear systems. Likewise, the evaluation of system performance and the determination of optimum performance is considered. It is pointed out that system performance can be accurately evaluated only when the system being evaluated is tested under typical operating

conditions. This point is illustrated by determining the optimum damping ratio as determined by the common RMS error criterion for a linear system characterized by a second order differential equation. The values of the optimum damping ratio so determined range from zero to infinity depending upon the input test signal.

Microfilm \$2.85; Xerox \$9.80. 219 pages.

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A NUMERICAL DESCRIPTION OF LOGIC CIRCUITS, AND ASSOCIATED METHODS FOR ANALYSIS AND SYNTHESIS

(L. C. Card No. Mic 59-703)

Donald Leo Dietmeyer, Ph.D. The University of Wisconsin, 1959

Supervisor: Associate Professor Charles H. Davidson

Problems of communication and a deficiency of methods of general applicability exist in the field of digital logical design. It is proposed to alleviate these problems by (1) representing the connection of signals to a logic circuit and the mode of operation of that circuit in a numerical form, (2) classifying existing logic circuits in terms of the limits within which such numerical information is significant, (3) developing a symbolism for the expression of that numerical information and its transformation into the Boolean function generated by the logic circuit so described, and (4) attempting to characterize numerically all Boolean functions.

Symmetry and asymmetry of a Boolean function may be numerically expressed in terms of a "multiplicity" (strength) assigned to each variable and complement appearing in the function. Functions exhibiting the same symmetries are characterized by unique values of "threshold", a quantity which alters only the form of the function and not its symmetry.

Multiplicity and threshold have physical significance in the magnetic core shift register stage in addition to characterizing Boolean functions as described above. Multiplicity conveys information describing the connection of signals as inputs to the stage; threshold specifies the mode in which the stage is to be operated.

The combinatorial symbol $C_{I}^{T}z$ symbolizes the logical operation of the magnetic core in terms of multiplicities and threshold: T reflects the multiplicities and I the threshold. In the sense that this symbol may be reduced to the Boolean function generated by the numerically specified core circuit, the numerical information can be said to characterize the function itself.

Expansions of the symbol $C_{I}^{T}z$ suggest rather simple procedures for synthesizing magnetic core logic circuits, by reducing the mathematics involved to the solution of simultaneous algebraic equations.

While the logical operation of a universal logic circuit capable of generating all Boolean functions is unknown, since no such circuit exists, possible logics may be hypothesized.

 C_I^Tz serves as a first attempt and approaches the true operation of a universal logic circuit in that it represents a surprisingly large number of functions. It is hoped that a study of those functions which C_I^Tz fails to represent will lead to a more accurate logical operation.

Microfilm \$2.35; Xerox \$8.20. 177 pages.

APERTURE-FIELD CHARACTERISTICS FOR MICROWAVE ANTENNAS WITH DISTORTED REFLECTORS

(L. C. Card No. Mic 58-7218)

Richard Elbert Gildersleeve, Ph.D. Syracuse University, 1958

The purpose of this dissertation was to devise analytical means for determining certain properties of microwave antennas and to attempt to verify these properties experimentally.

The primary subject under investigation was the study of the effects of surface distortions in reflectors upon the phase and amplitude distributions in the aperture plane. The radiation patterns of antennas are directly related to their aperture distributions. These distributions are known to be dependent upon several factors, one of which is the reflector surface. Two methods of attack were studied. The first was based upon the "current-distribution method", so called because the method requires the determination of current and charge distributions on the surface of the reflector from a knowledge of the incident field. The second method was based upon geometrical optics, whereby the phase and amplitude distributions could be determined when the equation of the reflector is known, by assuming that a quasi-point source is situated at the focus and that the incident and reflected fields behave according to ray theory. The first method is more exact but the services of a largescale digital computer were found to be necessary to obtain satisfactory results. Since solutions to the equations derived from the second method could be obtained without the aid of a digital computer this method was selected for complete analysis. The simplifying approximations used were experimentally shown to be reasonable.

Theoretical distributions were computed for several assumed reflector distortions selected on the basis of types known to occur in normal fabrication processes. Reflectors were fabricated using a technique devised in the course of the work, in which distortions of known shapes were introduced. Experimental data were obtained from these reflectors, as well as from an undistorted reflector, in support of the analytical work. Reasonably good correlation with the theoretical results was observed. Far-zone radiation patterns were obtained for comparison with available theoretical patterns which had been derived from assumed aperture distributions corresponding to those under consideration. Reasonably good correlation with the theoretical predictions was also obtained.

The field radiated from the distorted reflectors was studied using both linearly polarized and circularly polarized feed systems. With the circularly polarized feed, information concerning the influence of the reflectors upon the polarization was examined. Trends in polarization ellipse variations were observed which differed for reflectors with different types of distortions, indicating that the contour of the reflector tended to produce deteriorations in the polarization as well as in the far-zone patterns.

In conjunction with the study of polarization characteristics a new method for obtaining circularly polarized waves was devised and analyzed, using twin posts in circular wave guide which could be positioned relative to the incident field so that either linear or circular polarization (with either clockwise or counter-clockwise sense of rotation) could be obtained. The device was constructed and tested in the laboratory to determine such characteristics as the influence of post diameters, separation between posts, and types of metals upon circularity and bandwidth. Verification of the design dimensions was obtained.

Microfilm \$2.00; Xerox \$6.00. 124 pages.

OPTIMUM DESIGNS FOR INDUCTION MOTORS BY DIGITAL COMPUTER

(L. C. Card No. Mic 59-29)

Gurney Lindale Godwin, Ph.D. University of Pittsburgh, 1958

The design of rotating machinery is considered by many to be an art rather than a science, simply because it is impossible by hand methods to make sufficient calculations to eliminate the need for human judgment backed by years of experience. The development of an optimizing design program for induction motors was undertaken in order to answer the following questions. Can a practical program be written for a line of machines which will take the machine requirements as specified by the customer and without additional information produce a good, well-optimized design which will meet all the guarantees, doing the complete job without human intervention? Can the routine have built into it all of the experience and knowledge of an engineering group so that uniformly high quality designs can be produced that are independent of the experience and abilities of any single individual?

Optimized design requires the solution of a set of nonlinear inequalities where many of the variables are not continuous functions. Mathematical techniques have not been developed to obtain an explicit solution. The program should make a complete design, selecting materials and parts, and calculate all of the required performance data whenever a design is possible. If impossible requests are made, it should print out performance data for the nearest suitable designs.

A technique has been developed to eliminate rapidly the vast number of hopelessly unsatisfactory combinations of design parameters and to survey systematically those that remain, so that the optimum design is located as rapidly as possible. In order to locate the area of satisfactory designs, a generalized machine is considered with the number of parameters reduced to a minimum. Curves for each guarantee are calculated giving the relationship between air gap flux density and machine core length at the desired level of performance. The composite results obtained from a complete set of curves is a performance chart outlining the satisfactory design area. The design survey that follows

has been carefully organized to explore the design area and locate the optimum designs as efficiently as possible.

The computer explores untiringly every avenue available to it in its efforts to obtain a design tailored to the customer's requirements. The resulting designs are uniformly consistent, well balanced, do not contain excessive margins, and meet every customer requirement. These results contrast sharply with the wide variation that is obtained by a group of design engineers having different experience, using various modifications of the design method, and working under various pressures.

Since uniformity of design has been obtained, it is possible to study the effects of many contemplated changes to the standard parts, to develop better formulas, and to improve the design technique. The multitude of production design details have been assigned to a high speed digital computer that is far more accurate and efficient than the engineer in executing this type of routine work.

It is expected that the basic method developed here will be applied to many other lines of machines in the near future. In addition, one can expect the development of more comprehensive routines that will design standard parts now that a completely self-contained design program using standard parts has been developed.

Microfilm \$2.35; Xerox \$8.20. 177 pages.

POWER LOSS SURFACE FOR A π CIRCUIT WITH SUSCEPTIVE SHUNT ELEMENTS

(L. C. Card No. Mic 58-7565)

James William Nilsson, Ph.D. Iowa State College, 1958

Supervisor: W. B. Boast

The π circuit with susceptive shunt elements appears quite frequently in electrical systems. In many instances the circuit is a connecting link in the network over which a given amount of power is to be transferred. The electric transmission line in a power network is an excellent example of the π circuit in such a system. The purpose of this investigation was to study the I^2R loss of the π circuit as a function of its series impedance, terminal voltages, and power output.

The investigation started with the development of an equation for the power loss in terms of the variables E_1 (input terminal voltage), E_2 (output terminal voltage), R (series resistance), X (series reactance) and P_2 (output power). The loss surface for the π circuit evolved when the original variables in the power loss equation were put into dimensionless combinations by means of Buckingham's P_1 theorem. That is, the variables E_1 , E_2 , E_1 , E_2 , E_2 , E_1 , and E_2 were replaced by the variables E_1 , E_2 , E_1 , E_2 , E_2 , E_1 , and E_2 were so that the power loss E_1 was reduced to a function of two variables E_1 and E_2 . The study of the E_1 loss then became the study of the surface:

$$P_{o} = f(U, V). 1$$

The nature of the surface described by Equation 1 was obtained by alternately cutting the surface with constant P_o planes, constant U planes, and constant V planes. Letting

 $a = RP_2/E_1^2$, $\sigma = (1 + 2a)/2$, $\mu = \sqrt{1 + 4a/2}$, and $P_{oo} = E_1^2/R$ the results of the study can be summarized as follows:

1. The maximum value of P_0 is $P_{00}(\sigma + \mu)$ and the relationship between U and V at this maximum value is $V = U(\sigma + \mu) + \sigma - \mu$.

2. The minimum value of P_o depends on V. For $(\sigma - \mu) < V < (\sigma + \mu)$ the minimum value of P_o is a relative minimum and has the value $a^2 P_{oo}/V$. The relationship between U and V at this relative minimum is $U = (1/a^2) [V - (V - a)^2]$. For $V \ge \sigma + \mu$ the minimum value of P_o is an absolute minimum and has the value $P_{oo}(\sigma - \mu)$. The relationship between U and V at this absolute minimum is $V = U(\sigma - \mu) + \sigma + \mu$.

3. On any given P_o - V locus the limiting values of V are (U+1) ($\sigma-\mu$), and (U+1) ($\sigma+\mu$), hence (U+1) ($\sigma-\mu$) $\leq V \leq (U+1)$ ($\sigma+\mu$). On any given P_o - U locus the limiting values of U depend on V. For $(\sigma-\mu) \leq V \leq (\sigma+\mu)$ the minimum value of U is zero and the maximum value of U is (V/a^2) ($\sigma+\mu$) - 1; thus $O \leq U \leq (V/a^2)$ ($\sigma+\mu$) - 1. For $V > (\sigma+\mu)$ U lies on the interval $\{(V/a^2)(\sigma-\mu)-1\}$, $[(V/a^2)(\sigma+\mu)-1]\}$.

Because the expression for the absolute minimum value of $P_{\rm O}$ involves taking the difference between two numbers which are approximately equal a table was developed so that the absolute minimum value of $P_{\rm O}$ can be accurately calculated to six significant figures. For the sake of completeness the table also contains the figures from which the maximum value of $P_{\rm O}$ can be calculated.

Numerical examples are given in the thesis to demonstrate the application of the results obtained to a π circuit. Microfilm \$2.00; Xerox \$3.60. 62 pages.

TRANSISTOR VIDEO AMPLIFIERS

(L. C. Card No. Mic 58-7247)

Carl Richard Zimmer, Ph.D. Syracuse University, 1958

The purpose of this thesis is to study the properties and limitations of video amplifiers using both fused- and grown-junction transistors. In most cases, amplifiers using either local feedback or equalizing networks in the input or output circuits are considered.

The initial part of this work is concerned with approximating the frequency dependence of the small-signal fourterminal network parameters for a theoretical model of the transistor, including the effects of the base spreading resistance r' and the collector barrier capacitance C_{TC}. Approximate expressions for the parameters are obtained in both the common-base and common-emitter configurations, using the infinite product expansions of the functions involved. This process represents the function as the product of an infinite number of factors which, if multiplied together, would yield the power series expansion of the function. An advantage of the infinite product approximation is that the poles and zeros of the function may be readily determined, irrespective of the number of terms used. Also, this method gives excellent first order approximations for many important quantities, notably those related to the common-base current gain hab .

The results are then compared with measured data for

a fused-junction transistor. Due to parasitic effects within the actual transistor (notably leakage across the collector-to-base junction), agreement is largely qualitative for parameters which have theoretically high impedance levels. Also, the grown-junction transistor must be considered as having a base-spreading impedance \mathbf{z}_b , which may be approximated over the video frequency range by a parallel RC circuit. Methods of parameter measurement are discussed, with emphasis on the selection of equivalent circuits which minimize measurement errors at high frequencies. An active- π single generator equivalent circuit is described, and its parameters measured for a surface barrier transistor.

It is shown that low-impedance terminations are desirable in order to realize a high gain-bandwidth product for the common-emitter stage. Under these conditions the equivalent circuit may be simplified to include only the input impedance and forward current gain, taken as hie and hie respectively. This simplified circuit is then used to analyze the performance of both single stage and cascade amplifiers.

In the uncompensated case, the fused-junction transistor is preferable if corresponding transistor parameters (insofar as possible) are considered equal. This is also the case when input circuit compensation is used in the single stage amplifier. It is shown that this difference in performance may be reduced through the use of appropriate compensating networks, although the transfer functions obtained for the grown-junction case are quite complicated and the amplifier characteristics are not readily determined. Theoretically, however, the performance attainable with lossless interstage equalizing networks is essentially the same for either type if a typical value of \mathbf{r}_b^* is assumed.

It is shown that the effect of the transistor output impedance cannot be disregarded for load resistance values which are compatible with high level operation. A design procedure has been developed which utilizes output circuit and feedback equalization to extend the amplifier bandwidth and reduce non-linear distortion. This method is well adapted for use with the grown-junction transistor. An example is given for a commercially available unit which provides a peak output voltage of 30 volts with a voltage gain of 12 and a bandwidth of 4 megacycles.

Microfilm \$2.35; Xerox \$8.20. 178 pages.

ENGINEERING, HYDRAULIC

HYDROLOGIC STUDIES OF RAINFALL-RUNOFF CHARACTERISTICS OF LAKE MENDOTA TRIBUTARIES

(L. C. Card No. Mic 59-712)

Narendra Nagesh Gunaji, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor Arno T. Lenz

The Lake Mendota drainage basin is located in the south central portion of the State of Wisconsin, and is wholly contained in the Dane and Columbia Counties. The watershed is adequately covered with twelve weighing-type recording rain gages. Flow from four of the major tributary drainage basins, constituting 63% of Lake Mendota watershed area, is measured at control stations with automatic water stage recorders. The four tributary watersheds are from approximately 6.1 to 70.0 square miles in area.

The distribution of yearly precipitation in the watershed occurs during the season when the agricultural activity is greatest. The drainage basin is highly cultivated and is noted for its productivity in forage crops, oats, and corn.

Rainfall depth-duration frequency curves for the gage R 6-1 for 2, 5, 10, and 20 years frequency were calculated based on the principle of Log-Probability law. The areal distribution of high intensity storms that occurred in the basin were studied.

Drainage basin correlation of basins in the similar hydrologic zones was carried out by a statistical analysis of the average monthly streamflow records available. It was possible to correlate drainage basins by analytical methods and further investigations are necessary to modify the approaches.

An attempt was made to correlate base flow with rainfall and rainfall minus surface runoff. No direct correlation was found as more information is necessary with respect to groundwater table conditions and its seasonal fluctuations. Also infiltration rates of the soils should be known.

Comparison of the characteristics of two basins was made on the basis of the unit hydrograph and summation curves as obtained from the same storm of relatively high intensity which produced runoff on both the basins under study.

Estimates of probable evaporation, in the absence of direct measurements, was determined by the application of the heat-budget method. The probable evaporation estimated by the above method amounted to 31 inches on the annual basis which agrees with independent estimates of evaporation around the Madison Lake region.

Microfilm \$2.95; Xerox \$10.20. 226 pages.

ENGINEERING, MECHANICAL

AN EXPERIMENTAL INVESTIGATION OF THE VISCOSITY OF STEAM

(L. C. Card No. Mic 58-7984)

Henry Hooper Osborn, Ph.D. Purdue University, 1958

Major Professor: Otto W. Witzell

The work reported in this thesis is concerned with the development of a steady flow transpiration viscometer for the measurement of the viscosity of steam for pressures up to 7500 psia and temperatures up to 1200°F.

The capillary tube is 500 feet long with an ID of 0.083 in. and an OD of 0.25 in. and made of Type 347 stainless steel. It is coiled into a 10 foot diameter coil and located in a horizontal annular electrically heated furnace. The

pressure drop is measured with a steel tube mercury manometer employing differential transformers to detect magnetic floats on the mercury surfaces. Temperature is measured with calibrated chromel-alumel thermocouples and pressure with Bourdon tube gages. The flow rate is measured by collecting and weighing the condensate.

Calibration tests have been necessary to determine the internal diameter of the capillary tube and the effect of the curvature of the capillary tube. These tests have been done using nitrogen at room temperature and low pressures.

The thesis includes: a discussion of the assumptions made in the derivation of the equation for the flow through a tube and the significance of these assumptions in steam viscosity measurements; a discussion of the changes that have been made to the original apparatus arrangement to obtain improved operation; a discussion of thermocouple calibration problems; the results of the calibration tests; some results of tests with nitrogen at 500 and 900°F and pressures up to 1900 psia; and the results of all steam tests made on the apparatus so far, which includes tests at 450, 500, and 900°F and pressures up to 1000 psia.

The results of the steam tests confirm the results of Timroth, although there is some evidence that the rapid increase in viscosity near the saturation line that he indicates may be in error. The results here do not give as great a dependence on pressure as Timroth shows, although tests have not been conducted at high enough pressures to make this certain.

Microfilm \$2.80; Xerox \$9.80. 216 pages.

POSITION, VELOCITY, AND ACCELERATION
ANALYSIS AND KINEMATIC SYNTHESIS OF PLANE
AND SPACE MECHANISMS BY A GENERALIZED
PROCEDURE CALLED THE METHOD OF
INDEPENDENT POSITION EQUATIONS

(L. C. Card No. Mic 58-5883)

Francis Harvey Raven, Ph.D. Cornell University, 1958

This thesis presents a new method for the kinematic analysis and synthesis of mechanisms which have motion in three as well as two dimensions. A position equation for a point on a mechanism is a vector expression written in terms of the lengths of the links and their angles. The complex notation is used for these vector equations because of the ease of differentiating them. In this method, positions are always measured from a convenient ground point of the mechanism. Position equations which are mathematically independent are given the name independent position equations. These equations completely specify the position of the point as a function of the geometry of the mechanism. Four-link mechanisms with one degree of freedom have two, six-link mechanisms have three, and eight-link mechanisms have four independent position equations for any point.

A loop equation is a special form of a position equation. A loop equation is obtained by using the links as paths and writing the vector expression for the route that starts from any point and proceeds through the links of the mechanism and back to the starting point. There is one less independent loop equation for a mechanism with one degree of free-

dom than there are independent position equations for a point on the mechanism. Thus, four-link mechanisms have one, six-link mechanisms have two independent loop equations, etc. Equating any two independent position equations will automatically yield a loop equation. Depending on the particular problem, it will be more convenient to work with the independent position equations, or the independent loop equations, or a combination of the two.

Unknown positions are determined directly from either the independent position equations or the independent loop equations by substituting the known quantities into these equations and solving for the desired unknowns. The first and second derivatives with respect to time of these equations yields velocity and acceleration equations respectively, from which any unknown velocities or accelerations may be evaluated. This procedure for position, velocity, and acceleration analysis is demonstrated for a variety of mechanisms in Section I of this thesis.

Synthesis of cam systems is accomplished by successive differentiation of the independent loop equation for the cam system with respect to the angle of rotation of the cam. By this method, general equations are obtained for such cam parameters as the cam contour, pressure angle, length of contact of the follower, and radius of curvature. The application of this method to various cam systems, including three-dimensional cams, is illustrated in Section II. In addition, it is shown how convenient design procedures for analyzing particular cam systems may be developed from these general equations for the cam parameters.

The independent loop equation for a mechanism may be used as a basis for the solution of a variety of synthesis problems. This is discussed in Section III.

Microfilm \$2.00; Xerox \$6.80. 141 pages.

THE TRANSIENT TEMPERATURE DISTRIBUTION IN SEMI-INFINITE SOLIDS WITH MELTING

(L. C. Card No. Mic 58-7959)

James Edward Sunderland, Ph.D. Purdue University, 1958

Major Professor: Richard J. Grosh

A detailed analysis was made of the transient and steady state temperature distributions in a melting semi-infinite solid. The solid, initially at a uniform temperature, was heated by an environment at a temperature above the melting point. The coefficient of heat transfer was considered to be constant. After heating started, the surface temperature increased until it reached the melting point, at which time melting began. Two cases were considered as the body melted: one in which the melt was removed as it formed, and the other in which it was retained.

In the case where the melt was removed upon formation expressions were given for the temperature distribution before melting started and after steady state conditions developed. The use of finite difference techniques was employed for finding the transient temperatures and velocities. A digital computer was used to solve the difference equations and to obtain the velocity of the melting front. The results provide an easy method for determining

the velocity of the moving front and temperature at any given time.

For melting problems where the melt was retained as it formed, the analogy between heat and electricity was utilized. An electric circuit was constructed which simulated the thermal circuit. Two circuits were constructed: one can be applied to melting problems involving no change in properties between the solid and liquid phases, and the other can be applied to melting problems in which the change in properties with phase change is considered. In order to test the accuracy of the circuit, it was used to solve the problem of melting a semi-infinite solid, initially at a constant temperature and with its surface temperature impulsively raised to a temperature above the melting point. Neumann worked out an analytical solution to this problem and the results of the analog circuit were compared with his solution; the agreement between the analog results and the analytical solution was excellent. For problems where the properties of the solid and liquid phases could be considered equal, results were given for finding the position of the melting front.

An extensive survey of the literature was carried out and a table was made of the function $f(X) = \exp X^2 \operatorname{erfc} X$.

Microfilm \$2.00; Xerox \$5.40. 108 pages.

AN INVESTIGATION OF SIMILITUDE CONSIDERATIONS FOR A FAMILY OF GEOMETRICALLY SIMILAR COMBUSTORS

(L. C. Card No. Mic 59-41)

Eugene Clayton Woodward, Jr., Ph.D. University of Pittsburgh, 1958

This investigation provides an answer to the question, "Is there a law of similarity for combustion processes with fluid flow?" or, phrased differently, "Does there exist a set of dimensionless operating parameters for a family of geometrically similar combustors such that the dimensionless performance parameters (e.g., efficiency) will depend invariably on such operating variable parameters?"

Theoretical considerations based upon the concept of an effective overall (global) reaction order lead one to expect:

- (a) Perfect similitude of gaseous fired combustion systems is impossible.
 - (b) Under conditions of
 - (1) geometric similarity;
 - (2) constant inlet temperature (fuel and oxidant);
 - (3) specified gaseous fuel;
 - (4) specified gaseous oxidant;
 - (5) low Mach number flows;
 - (6) absence of body forces; and
 - (7) negligible heat losses to the walls;

a reasonable degree of similarity may be obtained by maintaining constant the terms β (a ratio of chemical reaction time to mixture residence time), W_f/W_a (fuel-air ratio), and Re (Reynolds number) for a model and a prototype.

A geometrically similar family of gaseous fired (propane-air) combustors of an idealized design having nominal diameters of 4, 6, and 9 inches were tested. Extensive experimental data are presented for $W_f/W_a=75$ at a constant inlet temperature of $680^{\circ}R$. for the Reynolds number

range 20,000 to 130,000. Data are also included to show effects of changes in $W_{\rm f}/W_{\rm a}$ and inlet temperature.

Some significant conclusions may be listed.

(a) Under conditions (1) through (7) of (b) above a high degree of similarity will exist if one maintains constant the terms β , W_f/W_a , and Re for a model and a prototype. Results taken at conditions where assumption (7) is not too well satisfied (e.g., small combustor operating at very high pressures) would be expected to yield a correlation which would prove to be rather unsatisfactory.

(b) The concept of the effective overall reaction order is most useful in describing the very complex reactions occurring in hydrocarbon-air systems. A similitude law based on this concept would be well founded as evidenced

by the strong experimental support offered.

- (c) The facility with which one is enabled to account for the physical phenomena in a combustion system by the use of the term β strongly favors its inclusion in any similitude considerations, as compared to such terms as the ratio of flow velocity to laminar burning velocity or the ratio of quenching distance to scale factor.
- (d) The effects of Re on combusion efficiency appear rather slight over the Reynolds number range 20,000 to 130,000 for a primary fuel-air ratio of 0.040 for the particular combustors investigated. A more significant effect of changes in Re in the range 20,000 to 70,000 is evident for a primary fuel-air ratio of 0.050. The preponderant influence of β on the combustion efficiency is clearly shown in both cases.
- (e) The effects of changes in inlet temperature, primary fuel-air ratio, and overall fuel-air ratio, on combustion efficiency appear slight for the particular combustors investigated. Significant changes do appear in the apparent overall reaction order because of changes in primary fuel-air ratio, but only a slight effect is noted for the change in inlet temperature investigated.
- (f) A range of values of the apparent overall reaction order for the diffusion type propane-air flame employed exists for the many different inlet conditions investigated. Values range from 1.10 to 1.40, the majority falling near 1.20.

 Microfilm \$2.00; Xerox \$6.00. 125 pages.

ENGINEERING, METALLURGY

THERMODYNAMIC PROPERTIES OF THE TITANIUM-OXYGEN-HYDROGEN SYSTEM

(L. C. Card No. Mic 58-7977)

Malcolm Thomas Hepworth, Ph.D. Purdue University, 1958

Major Professor: R. Schuhmann, Jr.

A modified Sieverts apparatus was used to study the partial pressure of hydrogen in equilibrium with a series of titanium-oxygen-hydrogen alloys. Measured amounts of hydrogen were introduced into specimens having a range of oxygen-to-titanium molal ratios.

A portion of the ternary isothermal section at 800°C. was determined. The range of compositions studied was

from 0 to 20 atom percent hydrogen and 0 to 14 atom percent oxygen. The activity of hydrogen was measured and plotted as isoactivity curves on the ternary isothermal section.

A form of the Gibbs-Duhem integration, modified for ternary systems was used to calculate the activities of oxygen and titanium. Iso-activity curves for oxygen and titanium were also plotted on the isothermal section. These curves extended to the titanium-oxygen binary system. Hence, the oxygen and titanium activities were calculated in the titanium-oxygen binary system by means of hydrogen partial pressure measurements in the ternary system. This procedure can be extended to measure activities in a number of binary systems in which direct measurement is not possible.

The experimentally determined activity of oxygen in the titanium-oxygen binary system was compared with the activity calculated from a model. This model was based upon the proposition that the oxygen atoms randomly occupy the octahedral interstices in α -titanium, but that each oxygen atom diminished the adjacent number of sites by two.

The heat of solution of hydrogen was determined for the α and β solid solutions as a function of oxygen content. Addition of oxygen had a more pronounced effect on the activities and heat of solution of hydrogen in the β solid solution than in the α solid solution.

Microfilm \$2.10; Xerox \$7.40. 158 pages.

STABILIZATION OF BAINITE TRANSFORMATION FOR A Mn-Mo AND 4340 STEELS

(L. C. Card No. Mic 59-639)

Tsu-Hsing Yeh, Ph.D. Syracuse University, 1958

Hardenability data do not, in general, support the concept that the continuous cooling diagram, in principle, can be derived from the isothermal transformation diagram. Therefore the continuous cooling and isothermal transformation diagrams for a Mn-Mo steel and 4340 steel are compared for a variety of transformation conditions.

A disagreement between the transformation diagrams for isothermal holding and continuous cooling is observed for both steels investigated. It seemingly results from stabilization of the austenite toward a specific reaction during the controlled cooling cycle in the upper sub-critical temperature range. The stabilization effect on the bainite transformation has been demonstrated by overall higher end-quench hardenability for the stepped treatment as compared to the conventional quench. From the fact that the hardness-cooling time curve for the 4340 steel austenitized at 1500°F establishes this steel as one of deep hardenability, while the large Jominy end-quenched bar showed a low hardenability, it can be predicted that a 4340 steel austenitized at 1500°F would harden through in larger sections after oil quenching than after water quenching. This behavior has been observed.

Microfilm \$2.00; Xerox \$4.40. 84 pages.

ENGINEERING, MINING

GEOCHEMICAL EXPLORATION IN SILICATED LIMESTONES AT DARWIN, CALIFORNIA

(L. C. Card No. Mic 58-7943)

Carl Fulton Austin, Ph.D. University of Utah, 1958

Chairman: Dr. Matthew P. Nackowski

Geochemical samples were collected from 5 areas located in silicated limestones at the lead-zinc-silver replacement type ore deposits at Darwin Mines, Darwin, California. The localities sampled included fractures and contacts.

Samples were analyzed spectrochemically. Preliminary semi-quantitative analyses included lead, silver, zinc, copper, iron, boron, and sodium. Lead was selected as the indicator element for ore. Lead was analyzed quantitatively using bismuth as an internal standard. The precision of the analytical procedure, stated as the relative standard deviation, was $\pm 22\%$.

The following conclusions were reached. The primary trace lead background value in silicated limestones was 18 ppm. Anomalous trace lead values increased logarithmically as ore bodies and mineralizing channels were approached. The dispersion distance in massive wall rock was 8-20 feet. Anomalies in trended trace lead dispersion curves reflected the presence of nearby ore bodies. Trended anomalies were found 30-35 feet from known ore. Most of the anomalous trace lead was caused by galena, or lead bearing products of weathering. Background values are probably caused by substitution of lead for calcium and potassium in existing minerals or adsorption on mineral surfaces. The dispersion curves indicated either rapid diffusion from a short lived source or slow diffusion from a long lived source. The trace lead dispersion patterns suggested both permeable beds and fractures served as ore solution conduits. Secondary trace lead anomalies were found in chemically weathered areas.

Microfilm \$2.40; Xerox \$8.40. 184 pages.

ENGINEERING, NUCLEAR

HEAT AND MASS TRANSFER IN CLOSED, VERTICAL, CYLINDRICAL VESSELS WITH INTERNAL HEAT SOURCES FOR HOMOGENEOUS NUCLEAR REACTORS

(L. C. Card No. Mic 58-3670)

Frederick Gnichtel Hammitt, Ph.D. University of Michigan, 1958

One of the most promising concepts for compact, packaged nuclear powerplants is that of a homogeneous liquid core, into which the heat transfer surface has been incorporated. Fissile material is dissolved in a suitable solvent or suspended as a slurry. Heat is transferred directly to the coolant stream which can be the heat engine

working fluid. For this arrangement, detailed knowledge of the heat and mass transfer phenomena within the liquid fuel is of extreme importance. This dissertation provides a preliminary basis for the understanding of these phenomena.

Results from a theoretical and experimental investigation of heat transfer and fluid flow in a closed, vertical vessel, with volumetric heat sources are presented. The consideration of a closed tube with internal heat sources wherein end effects are of importance is unique. The heat source distribution is arbitrary axially; uniform radially. Heat is removed through containing walls subjected to arbitrary axial temperature distribution, uniform tangential distribution. The study is limited to fluids with Prandtl's Number of the order of unity. Because of the application to power reactors, the experimental investigation was confined to high volumetric heat source rates for which turbulence might be expected.

No comprehensive experimental or analytical data for the configuration exists in the literature. There is considerable experimental data for natural convection in other specialized cases. The effects of internal heat generation are not generally included and the application of results to widely different configurations is not feasible.

For maximum applicability, test sections with differing dimensions, dimension ratios, and cooling system arrangements were used. The non-dimensional volumetric heat source was varied over a range of about 1000. Resultant non-dimensional velocities, temperature differentials, and heat transfer coefficients are presented.

To obtain a basis for extrapolation to geometries and conditions differing from those investigated, a theoretical solution, giving velocities, temperatures, and heat fluxes throughout the vessel has been derived. It is based on an extension of Lighthill's method. For mathematical feasibility considerations were limited to laminar flow. Arbitrary axial distribution of wall temperature and heat source was included. Results are plotted for various heat source strengths, axial distributions, and axial wall temperature distributions. A non-dimensional parameter, \mathbf{q}_{v} , depending upon volumetric heat source strength, vessel dimensions, and fluid physical properties was used to correlate both theoretical and experimental results.

Turbulence ranging from near zero to substantial eddying motions existed for the experimental results. The theoretical laminar solution shows variation of the dependent quantities for changes in the independent parameters of heat source and wall temperature distribution and strength and vessel geometry. The overall nature of the theoretical laminar flow pattern was found experimentally even with substantial turbulence. Theoretical temperature and velocity profiles, wall heat flux distribution, and variation of heat transfer coefficients with variation of the independent parameters has been substantiated. The magnitude of overall temperature differential for a given rate of heat transfer was found experimentally to be less than the laminar anticipation by a factor of about 2.5 for the higher range of non-dimensional heat sources and 1.5 for the lower. The discrepancy decreases for reduced turbulence.

Methods for solving the overall problem of a natural convection cell and a forced convection cooling system are investigated. Microfilm \$3.05; Xerox \$10.60. 236 pages.

DYNAMIC BEHAVIOR OF BOILING WATER REACTORS

(L. C. Card No. Mic 58-7730)

Modesto Iriarte-Beauchamp, Ph.D. University of Michigan, 1958

In this dissertation the internal dynamics of a boiling water reactor are developed. The theory can be applied to the natural circulation boiling water reactor, to the forced circulation boiling water reactor, or to the dual cycle boiling water reactor.

After a brief introduction and general description, the basic equations for the reactor transfer function and fuel element transfer function as described in the literature are presented (sections I and II).

The author then proceeds to develop a transfer function for the mechanism of bubble growth within the reactor core. This transfer function is primarily based upon the net heat energy available for vaporization. The energy available for vaporization is simply defined as the total heat energy coming out of the fuel plates less the energy taken by the subcooled fluid in being raised from the initial or inlet temperature to the system saturation temperature.

All the variables that enter into the amount of heat taken by the subcooled fluid are then considered in detail. These variables in the order treated are

- 1) Fluid inlet velocity in the reactor core;
- 2) Fluid inlet temperature in the reactor core;
- 3) System pressure.

The author then proceeds to consider the direct effects of system pressure on steam bubbles. The effect of a temperature coefficient of reactivity is also discussed.

All the derived differential equations, which are expressed in the notation of the Laplace transformation or the language of transfer functions, are then combined to form a fairly complicated system with many feedback paths in which the bubble void volume response can be obtained due to small changes in any or all of the dynamic variables involved.

The bubble void volume response is then multiplied by the so-called void coefficient of reactivity or per cent change in nuclear multiplication constant per per cent change in fractional steam void content to obtain the total reactivity feedback. This is then used to determine the overall frequency response or transfer function of the reactor.

As a special case the theory is then applied to the Experimental Boiling Water Reactor (EBWR) at the Argonne National Laboratory, Lemont, Illinois, and the frequency response is calculated for the overall loop. Agreement between theory and experiment is shown to be good at the power level considered.

Microfilm \$2.45; Xerox \$8.60. 188 pages.

ELASTIC-PLASTIC THERMAL STRESSES IN CYLINDRICAL REACTOR FUEL ELEMENTS

(L. C. Card No. Mic 58-7741)

Tariq B. Khammash, Ph.D. University of Michigan, 1958

An elastic-plastic solution, in closed form, of a cylindrical reactor fuel element of isotropic work-hardening material, which includes the determination of stresses and displacements, is obtained in this dissertation.

While Chapters I and II contain primarily the introductory remarks and general background, Chapter III contains the elastic-plastic solution of the axisymmetric cylinder in the state of plane strain subjected to internal pressure and a temperature gradient.

In Chapter IV, the elastic-plastic axisymmetric solid cylinder in the state of plane strain and subjected to external pressure as well as a variable heat source is considered in detail. The complete solution for isotropic work-hardening materials is deduced with the use of Tresca loading function and is expressed in terms of exponential integrals and incomplete gamma function. Numerical results for both linear work-hardening and perfectly plastic materials are obtained and they display the significant effects of work-hardening. In addition, comparison of the results between the case of variable heat source and a source of uniform strength is made where again pronounced effects of the variable heat source is revealed.

Microfilm \$2.00; Xerox \$5.40. 109 pages.

FOLKLORE

FOLKLORE

A CLASSIFICATION OF MOTIFS IN THE TRADITIONAL BALLADS OF SPAIN

(L. C. Card No. Mic 58-5966)

Hugh Nelson Seay, Jr., Ph.D. The University of North Carolina, 1958

Supervisor: John E. Keller

As a contribution to the monumental project of cataloguing motifs in the folk literature of the world, this study follows the universally recognized motif-index plan devised by Stith Thompson. Heretofore, motif-indexes of Spanish literature have dealt almost exclusively with narrations in prose. This classification, therefore, is designed to serve the need for a more adequate coverage of traditional Spanish narrative by providing a motif-index of that important body of narrative poetry known as the Spanish ballads.

Since the long-awaited definitive edition of traditional Spanish ballads by Ramón Menéndez Pidal has not yet appeared, the text chosen for excerpting motifs is the collection included by Marcelino Menendez Pelayo in his Antología de poetas líricos castellanos. This is the only collection which contains a large number of ballad versions from both ancient and modern oral tradition. It may, therefore, be said to be the most representative collection available.

A special section of the thesis called the "motif-analysis" is, essentially, a grouping of motifs according to occurrence in each individual ballad, thus forming a series of "skeleton" plot summaries. Designed as an adjunct to the idealogical motif-index, the motif-analysis makes it possible for individual motifs to be seen in relation to the other motifs of their respective narrative-complexes. It has the additional advantage of listing ballads in an order that supplies a more convenient means of comparing variants than is possible with the unsatisfactory arrangement of the Menéndez Pelayo collection.

The principal purpose of this classification is to provide a handy reference work for students of comparative literature and thematology as well as for folklorists and Hispanists. However, the study allows us to arrive at the following general conclusions: (1) the traditional Spanish ballad is predominantly realistic, with little humorous or moralizing content; (2) sex and love, punishments, and deceptions are preferred above all other motif categories; (3) the supernatural element is not found to a very large degree, yet neither is it as infrequent as has been generally supposed; (4) the majority of the motifs has not yet been encountered elsewhere; (5) the unique nature of the thematic content of Spanish ballads would indicate that many of these motifs will continue to be peculiar to Spanish ballads.

Microfilm \$3.80; Xerox \$12.80. 295 pages.

GEOGRAPHY

FARM LAND ABANDONMENT IN THE NORTHWEST ADIRONDACK FOOTHILLS

(L. C. Card No. Mic 59-669)

Joseph William Brownell, D.S.S. Syracuse University, 1958

This dissertation sets out to accomplish two objectives. The first is to bring into focus the fringe of farm land abandonment which appears to encircle the Adirondack Mountains in New York State. The second is to develop a simple survey method by which a single researcher may map the pattern of farm land abandonment here and elsewhere.

This technique entailed the use of a series of highway traverses crossing the anticipated zone of abandonment. Along each of these highways farm land was judged and classified to determine the limit of seriously abandoned land. Connection of these points produced the approximate boundary of the abandonment area.

The resulting map of the northwest Adirondack foothill area shows a pattern of abandonment that lacks uniformity. Three subdivisions of the abandonment section are distinctive in shape and internal characteristics. One lies in the southeastern sand terraces of Lewis County where abandonment is widespread and thorough. A second comprises an area of sand and foothills east of Watertown, largely in Jefferson County. Here, government acquisition of land has extended abandonment in an area already partly abandoned. The third is primarily a part of the St. Lawrence County foothills where rural nonfarm residence is common and abandonment is a continuing process.

An anomaly exists in Lewis County where an unabandoned section separates the first two of these divisions in the vicinity of Croghan. Here, a small Mennonite colony has worked the soil successfully for over a hundred years.

The relation of these patterns to other cultural and physical phenomena demonstrates that the principal cause of abandonment, which in many areas is still taking place, is the existence of poor soil which cannot be worked in satisfactory competition with areas of more capable and productive soils. Although the extent of their influence is not as easily established, nonfarm employment opportunity and the distance of farms from highways and communities also appear to contribute to the decline of agriculture.

The outlook for farming in the foothills is bleak. To some degree the future use of the land will depend on industrial development in nearby cities and villages. In prosperous times one might expect an increase in nonfarm residence and utilization of the land for recreational (hunting and fishing) purposes. It is not likely, however, that an economic recession would be accompanied by a successful "back to the land" movement. Although this area will continue to support scattered farms, it is improbable that it will recover the moderately successful agricultural position it once held.

Microfilm \$2.20; Xerox \$7.80. 168 pages.

CHANGING PATTERNS OF CATHOLIC POPULATION IN EASTERN UNITED STATES (1790 -- 1950)

(L. C. Card No. Mic 58-7086)

Sister Mary Ursula Hauk, R.S.M., Ph.D. Clark University, 1958

To study the distribution and shift in the centers of Catholic population at various periods in our country's history was the author's primary purpose. Closely related to the major objective is the field of immigration; a survey of its impact on Catholic population is therefore included.

Choropleth and relative change maps, as well as semilogarithmic, circle, and bar graphs are utilized wherever they serve best to portray the historical and statistical material that was collected.

The time span (1790-1950) made it necessary to use several methods for assembling data. For the earlier periods, no complete records of Catholic population exist, so all information had to be collected from historical sources. In 1890, the Bureau of Census published statistics concerning the church-going population. An adaptation of the 1926 Census of Religious Bodies data served for the 1920 period. For the final portion of the study, direct contact was made with diocesan chancery offices in eastern United States, to which the study was limited. From many of them 1950 county or parish figures were obtained; for a smaller group estimates were made from the 1957 data; for three states a Southern survey was the source. The National Council of Churches Bulletins on Church Membership were used for one diocese. Finally, less than twenty counties were estimated from the 1936 Census of Religious Bodies.

For every period, the resulting figures were compared with the civil population. The percentages obtained became the basic information for the series of distribution and density maps, as well as for most of the other maps and graphs. One other series of maps was constructed, using total and Catholic immigration data from major source countries.

Some remnants of early French and Spanish Catholic missionary work were found in New England, New York, and Florida at the beginning of the national period. Among them were the Indians of Maine and New York. English Catholicity centered in Maryland (southern counties of the Western Shore). Pennsylvania had a fairly large number, while Virginia, Delaware, New Jersey, and New York had smaller groups. Except for the lingering influence of the French and Spanish, New England and the Southern states had little acquaintance with Catholicism.

From the early shore and river locations, Catholics moved inland with the advent of post roads, public works, canal and railroad building, and the opening up of other economic activities, such as quarrying, lumbering, mining, and manufacturing. Especially notable was the advance of the Irish along the lines of canals and railroads, for which

they were the chief source of labor. Social as well as physical and economic factors, influenced Catholic settlement. Among these were national loyalty, family ties, and love of their religion.

As the early pioneer pattern changed in the North, the relative center of Catholicity moved steadily from St.

Mary's County in Maryland to New England, where it has remained since 1890. Concomitant with its growth was the influx of immigrants. The Irish were followed by French-Canadians in New York and New England, and later by immigrants of Southern European origin. Some French appeared in northern New York, Portuguese in Massachusetts, and Spanish in Florida. More Germans went to the Middle Atlantic States and Maryland (especially Baltimore) than to New England. Judging by the portion of Catholic population found in metropolitan areas, at least 85% of eastern Catholics are urban dwellers. Catholic population has increased at a faster rate than the total population, but the difference in rates is decreasing.

In view of present immigration practices, it is unlikely that the Catholic population will again grow at the rates that prevailed from 1840 to 1920. Present-day transportation, diffusion of industry, and suburban living would suggest that the dispersion of Catholic population will continue. Microfilm \$3.05; Xerox \$10.60. 236 pages.

LIBYA: A GEOPOLITICAL STUDY

(Publication No. 24,506)

Abdul Amir Majeed, Ph.D. The Ohio State University, 1952

This geopolitical study of the Libyan problem is of particular interest because of the unique role played by the General Assembly of the United Nations in finding a solution that recognizes political realities and strategic considerations, and, at the same time, upholds the promises of the Charter concerning the paramount interest of the inhabitants of territories that are not self-governing.

"Libya," as a geographical term, needs clarification. The word itself is very old. Herodotus, among other classical writers, mentioned it frequently. Revived after a long period of neglect by the Italian geographer F. Minutilli, it was officially adopted by the Italian government in 1911, after the region had been declared under the complete sovereignty of Italy. The term "Libya" then entered international usage.

Geographically, Libya has much wider significance, for the frontiers of Italian Libya were mere lines, for the most part, laid down arbitrarily on the map. The country does not change in character at these frontiers, nor for hundreds of miles beyond. To the geographer, Libya implies the whole vast tract between the Mediterranean and the Sudan scrub and grasslands, and between the mountains of the central Sahara and the Nile. This huge area, over a million square miles in extent, is essentially one unit and is dominated by one main characteristic – aridity. Libya in this sense is the Libyan desert, one of the most extensive and truly arid regions on the face of the earth.

The Gulf of Sidra, where the Sahara sweeps down in desolation to the sea, divides the two regions of Tripolitania and Cyrenaica. Consequently these two regions have been

culturally distinct throughout almost all of their recorded history, and have been only rarely and insecurely joined politically. The Gulf, which is now, broadly speaking, a frontier between nomads and settled agriculturalists, was at one time the frontier between Greeks and Phoenicians. Both planted their outposts on this stretch of African coast. Cyrenaica was the only part of Africa which belonged to the Greek World. Apollonia, Barke (Barce), Teuchira, and Euesperides were the most important of the Greek colonial cities.

While Greek Cyrenaica was building up a wealth founded on agriculture, Phoenician Tripolitania was following a very different path. The Phoenicians, by contrast, were not colonizers but the world's carriers; they founded, not colonies, but trading stations and merchandise depots. Such were the cities which sprang up on the coastal fringe of Tripolitania - the Tripolis of Sebratha, Leptis Magna, and Oea. The dependencies of Carthage owed their prosperity, not to the development of the surrounding country, but to handling the commerce of the distant hinterland of the Sudan and trans-Saharan lands.

Direct Roman rule in Tripolitania may be dated from the end of Carthaginian rule (149 B.C.). A century later the Romans extended their power over Cyrenaica also, and for the next 400 years this territory was under Roman domination. On the whole, this was a period of peace and prosperity for Libya, although the Libyan nomads never ceased troubling the frontiers.

The prosperity of the country at the Roman period is shown by the numerous remains of houses, baths, theatres, and temples.

The subsequent history of this country is that of the decadence and destruction of a civilization. The Vandals who crossed over to Africa took Tripoli in A.D. 479, but Emperor Justinian of Byzantium recovered it, as well as Carthage, in A.D. 533.

The first Arab invasion of Libya started in A.D. 641. However, this did not lead to a stable subjugation of the territory. The real founder of the Arab rule in North Africa was Ukba ibn Nafi. He started his campaign by reconquering Barka, and then extended his conquest of Ifrikya until he finally succeeded in destroying the Byzantine rule in North Africa and in subjugating the rebellious native Berber tribes. After the Arab conquest, Cyrenaica and Tripoli became part of the Arab territory of North Africa (Ifrikya) and were merged into the Arab empire. Thus their history is only a part of the general history of the Arab empire.

The second Arab invasion took place in the eleventh century. Beni Hillal and Beni Sulaim, who were residing in Egypt at that time, were induced, for political reasons, to march into Cyrenaica and Tripolitania. These Beduin Arabs, especially Beni Sulaim, established themselves in considerable numbers in this region. Thus they speeded up the process of the Arabization of the country at the expense of the Berbers.

Libya became part of the Ottoman Empire through the efforts of the brothers Barbarossa in 1551. However, the Ottoman rule in Libya, because of distance and the weakness of the Ottoman government, was relatively ineffective, especially outside the big cities.

Cyrenaica and Tripolitania continued to be Ottoman Vilayets until the Italian conquest in 1911.

Libya's geographical position on the African continent and its configuration are marked by several characteristics which have had, and always will have, a strong influence on its political and economic history and development. First of all, there is the geographical fact of its location on the coast opposite the Italian mainland and island group. Libya, therefore, was destined by nature to invite Italian expansion.

Having achieved her unity in 1870, Italy bent all her efforts to the task of organizing her internal forces so that she could exert a stronger political influence in world affairs. Her quest for colonies came late, after the great powers of Europe had already acquired the bulk of their colonial empires. Nevertheless, at the end of the century Italy was already well entrenched in Eritrea and Somaliland, and she had her eyes turned toward Libya, where for a long time she had conducted a peaceful penetration and had practised a watchful policy. The international struggle which Italy sustained in order to secure her right in Libya was a hard and long one. Nevertheless, it was ultimately achieved, and Italy found herself ready to launch the longanticipated enterprise of occupying Libya by force. This occupation was completed in the fall of 1911, and by the Treaty of Lausanne in 1912 Turkey renounced her rights to the last territory she held in Africa. However, despite the withdrawal of the Turkish forces, native resistance continued, and was not finally crushed until 1932. In this war of conquest the Fascist government of Italy was accused of all kinds of cruelties and atrocities in its efforts to intimidate the native population and break their will to resist.

Fascist Italy embarked upon a policy of mass colonization in Libya with complete disregard for the welfare of the native population. The mass migration of Italian peasants, officials, traders, and craftsmen of all kinds threatened the very existence of the Libyans, especially the poor peasants and the Bedouins, who saw themselves forced either to eke out their lives in the inhospitable desert or to migrate to the towns as unskilled laborers. The Italians intended this to be their fate, and it might well have been so, had not the events of World War II changed the course of Italian policy there and finally led to the ejection of the Italians from Libya.

Very little is known about the political situation in Libya during the three centuries of the Ottoman rule, but one may say with some confidence that the Turks had little effect upon the people of this area, especially the nomadic tribes who continued to follow their traditional way of life and to settle their own affairs by themselves.

The Karamanli rule, which gave Libya a semi-independent status, could hardly be considered as a spontaneous nationalist movement comparable to that of Muhammed Ali in Egypt, for the national consciousness was too weak to influence it. Libyan national sentiment was enhanced and strengthened by the Sanusiya Order, which was established in Cyrenaica about the middle of the nineteenth century. This Order, which started as a religious organization, developed into a political institution as well. In the struggle against the Italians, it became more and more a political organization which directed, administratively, economically, and militarily, almost the entire country against the common enemy. With the success of the campaign of subjugation that was conducted by Italy against the Libyans, Libya sank into the darkness of the Fascist regime to emerge again amidst the world clash. The aggressive expansionist policy of the Fascists drew Italy into the world conflict; hence Libya was brought again into the battlefront.

Armies of both sides rolled back and forth across her desert and hills. The bloodiest battles, which finally determined the Italian fate in Africa, were fought on her land. The post-war settlement, which naturally involved the former Italian colonies, brought Libya into the forefront of international politics. In the light of the development of air warfare and the new policy of strategy employed by the big powers in the post-war period, the geographical location of Libya in North Africa, with its long Mediterranean frontage, gives that country a special strategic value. These factors have served to aggravate the situation and have made it difficult to reach any solution whose prime aim is the welfare of the native population. Therefore, the hard and long international bargaining ended in complete fiasco. Having failed to reach a settlement for this problem, the big powers decided to refer the question to the United Nations Organization. It then fell to this organization to play the major role in solving the problem. Its efforts culminated in the resolution of November 21, 1949, which was considered, under the circumstances, the most feasible and practicable solution.

The geographical foundations of the new state involve physical as well as human and economic bases.

In the evaluation, the physical foundations of the state, location, size, shape, climate, and relief, should be given special consideration. Libya's frontage of 1,400 miles on the southern shore of the Mediterranean gives its location a particular importance from both the economic and the strategic points of view. Moreover, Libya's vicinal location gives her an advantage in maintaining contact with the Middle East through Egypt and with the western basin of the Mediterranean through Tunisia.

The advantages offered by the large size and the compact shape of Libya have been tremendously reduced by desert conditions. Aridity is the outstanding characteristic of the Libyan climate, and its far-reaching effects have influenced all aspects of human, economic, and political life in that country. The insufficiency and variability of the annual precipitation has reduced the area of productive land and thus limited its economic potentialities and bequeathed to the new state a serious economic weakness. The mode of life has also been affected, since nomadism is the predominant way of life in the larger part of Libya. Aridity has expressed itself clearly in the distribution of population. Human settlements have been established in small areas either where precipitation is adequate or where underground water is obtainable in sufficient quantities. Because of these conditions, the country has been reduced to a number of settlements isolated from each other by vast solitudes of desert. Thus the political unity of the state has been seriously weakened.

Relief, in so far as military defense is concerned, does not offer many difficult obstacles to invaders. However, the desert forms a natural barrier surrounding Libya on all sides. While it is true that the development of techniques of modern warfare has reduced the strategic value of such a natural barrier, nevertheless the desert with its loose sand, its aridity, and its severe climate still presents a formidable obstacle to an invading force. The boundaries of Libya are a striking example of desert boundaries. These boundaries are mere straight lines laid down on the map. They are, for the most part, artificial boundaries, made on paper at conference tables. Nowhere in Libya do the natural boundaries coincide with the political ones. The country itself does not change in

character at the boundaries, nor for hundreds of miles beyond.

The total length of the land boundaries of Libya measures about 2,780 miles, of which only 530 miles have been charted. This distance cannot be considered great in proportion to the area of the country.

The ancient racial basis of Libya is the so-called Libyan people who belong to the Hamitic race. However, Libya, with its position in the central basin of the Mediterranean, had attracted the seafaring nations and conquerors from the very early days of its history. Phoenicians, Greeks, and Romans have been integrated into the racial structure of the population. However, the most important anthropological and cultural influence was brought by the Arab invasions. The Arabs assimilated all remnants of the older races and cultures and gave the population its present racial and cultural structure.

At the present time Libya has a very small population, irregularly distributed over the vast area of the country. Climatic as well as physiographic factors have played a decisive role in shaping the pattern of this distribution. Thus the bulk of the country's population, located in rather small but well-watered areas, is an inevitable human response to geographic conditions.

The ethnographic structure of the present population is composed of Arabs, Berbers, and some other minor groups. The Arabs established themselves in North Africa following the conquest of that region in the middle of the seventh century. However the invasion of Beni Hillal and Beni Suleim in the eleventh century introduced the first numerically important infusion of Arab blood into North Africa and succeeded in converting Libya, at least culturally, almost completely into an Arab land. The Berbers are classified as a Hamitic race. The majority of them live today in Tripolitania in the western part of the Jebel region around Nalut, Zuora, and Jebel Nefusa. However, even in this region there are strong Arab elements, and the Berbers live side by side with Arabs in the same villages. There is little prospect that the Berber population might in the future form an anti-national ethnographic group which could create a political problem for the new state, since their great devotion to the Mohammedan faith tends to bind them to the Arab population and to offset any ethnographical differences. The long process of Arabization has weakened the national consciousness among the Berbers and eliminated conditions that might create future difficulties.

The Italians form the larger part of the foreign element in the country. This minority constitutes the only antinational ethnographic group of any importance that might in the future create political as well as social unrest for the state.

The Jews, who have lived in Libya since the time of antiquity, have now almost completely left the country. There are a few thousand Negroes and also Cologhis who are descendants of Turkish mercenaries or slave soldiers of the old Ottoman Empire.

Analysis of the human elements shows that Libya has a relatively homogenous population and represents ethnographically a single group, despite its divergent past. This population speaks one language, practises one religion, and finally shares common economic interests. All these are factors providing the Libyan state with a strong basis for national unity, without which a modern state cannot be established.

However, the advantage which the human elements pro-

vide to the state is facing a serious challenge, one posed by the backward stage of technology. In general there is a shortage of trained, capable men in all fields of culture, politics, and economic life. This presents a great handicap to the progress of the new state. Only outside technical help (through the United Nations Organization) can relieve the state of this burden, which is entirely too heavy for her to carry alone.

In a political geographical study it is necessary to emphasize the fact that agriculture is still the major occupation of the Libyan people and will continue to be so, since nature has endowed this country with meager resources beyond those of the land.

Historical evidence shows that the present systems of land use in Libya are the result of political and social instability. Failure to maintain the high level of agriculture attained by the Greeks and the Romans has been due, not to important changes of climate, but mainly to a change from sedentary to nomadic agriculture brought about by lack of security.

The productive land in Libya is estimated to be approximately 14,000,000 hectares, of which 10,500,000 are grazing land and are not considered suitable for any other purpose. Of the remaining 3,500,000 hectares, about 500,000 hectares are devoted to sedentary farming. Shifting cereal cultivation by Arabs is found throughout the rest of the 3,000,000 hectares.

Barley and wheat are the main cereal crops. However, barley is much more reliable, since it withstands the climate and poverty of the soils better than wheat. The olive is one of the most important crops of Libya, especially in Tripolitania; it is well adapted to the soil and low precipitation.

The date is the principal fruit of the country, and it is a staple food of the native population. Palm trees are found throughout most of the country. Other fruits and vegetables are widely raised in Libya.

Until recently, livestock has been the agricultural mainstay of the inhabitants of Libya. A number of factors would seem to indicate the wisdom of developing the country's agriculture around livestock. These factors are (1) the price livestock products command in the world market; (2) the scope for increased development of livestock in Libya; (3) the closeness of the territory to Europe and its location on a major trade route; (4) the favorable geographic conditions of the country (climate and relief).

Industrial possibilities in Libya are definitely limited. The country lacks essential mineral resources (coal, iron, oil), local capital, and skilled labor. There are few if any possibilities for hydroelectric power; transportation is poorly developed. For the present and probably for a long time to come, manufacturing will be confined to the native crafts and to those small industrial enterprises that require a minimum investment and can utilize local raw materials. During Italian rule, Italy's share of Libya's foreign trade was about 90 per cent. However, the political changes brought about by World War II and the disappearance of Italy as a dominant political power in Libya resulted in an important change in the trend of her foreign trade, disadvantageous to Italy. However, Italy, owing to geographical as well as economic reasons, is bound to regain her leading position in Libya's foreign trade, once political stability is achieved.

Generally speaking, Libya is not a country of merchants, as it was during the Phoenician period, since the per capita value of her trade is relatively low. Thus foreign trade, although it continues to be an important factor, will not exert a great influence on Libya's relationship with other countries.

An examination of transportation problems in Libya does not indicate that the relief of the country presents many handicaps to transportation. Handicaps tend to arise rather from the climatic conditions which affect the entire economic and social life of the country and which in turn, affect transportation indirectly. Consequently, the railroad system of Libya is but a loose, disconnected net, built with the sole intention of linking some productive areas of the interior with the coastal cities. This railroad system not only does not provide Libya with a complete network connecting all parts of the country and moulding it into a single compact unit, but it is bound to create in the future serious military as well as administrative problems to the new state.

The infant state of Libya, which was born at the end of 1951, has had to carry from its birth the burden of numerous and complicated social, economic, and political problems. The new state's major weakness is financial. Meagerness of natural resources, foreign rule, and finally destruction during World War II brought the country to the verge of bankruptcy. The United Kingdom of Libya must face the harsh fact that it is a poor country, where an income per capita of \$35 annually is the lowest in the Middle East. However, possibilities for development exist in both agriculture and horticulture.

It must be stressed that without the assistance of modern techniques and capital, the Libyan cannot utilize the economic possibilities of his country more fully than he has already done. To carry out a program of economic development in Libya aiming at an increase in productivity of the country and a raising of the standard of living of its inhabitants, it is necessary to enlist financial and technical assistance from outside, for the Libyan government, is not able financially and technically to undertake such work at the present time, nor will it be able to in the future. However, the United Nations Organization, which sponsored Libyan independence, is in a position to render this kind of help, free of any political strings. If such a program could be largely achieved, there is every reason to believe that Libya could pay her own way. Her people could even look confidently to a more prosperous life than they have so far

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THE TRANSITION ZONE BETWEEN THE CORN BELT AND THE HARD WINTER WHEAT BELT

(L. C. Card No. Mic 58-5912)

Robert Paul Marple, Ph.D. The University of Nebraska, 1958

Adviser: Leslie Hewes

The regionalization of agricultural production has undergone constant study and revision. The purpose of this investigation has been to study the characteristics of a

boundary area by devising a method of delimiting a transition zone rather than a definite linear boundary separating the Corn Belt from the Hard Winter Wheat Belt. Analysis of the geographic and economic factors which provided the setting for this transition zone were than studied to develop an understanding of the region of transition. Examination of change within the cores as well as within the transition zone has developed a concept of the trends toward a smaller, more definitive transitional area between the agricultural regions involved in the study.

To delimit such a transition zone, "core" areas within the two regions were selected upon the basis of percentage of the total land in farms devoted to the crops of first and second rank in the respective regions. The Corn Belt core was defined as the county and its contiguous counties which, as an areal unit, devoted the highest percentage of its farm land to corn and oats. Similarly, the core of the Hard Winter Wheat Belt was determined by the concentration upon wheat and sorghum. The transitional portion of the study area was delimited by the use of two criteria, both based upon conditions within the cores.

The first criterion was relative balance between core crops; the second criterion was the portion of farm land devoted to the four core crops to insure a degree of concentration sufficient to warrant a transitional classification. These criteria were applied to the data of the agricultural censuses from 1924 to 1954 and a transition zone was bounded by inclusion of all areas transitional in five of the seven study intervals.

The factors analyzed in the study of the transition zone were climatic factors, principally temperatures and precipitation; edaphic factors, such as, physical regions, soils and the slope of the land; and, economic factors, such as, relative dollar return per acre of the crops studied and the relative cost of production. Furthermore, changes in land use practices throughout the period of study were examined for both core areas as well as the transition zone.

The study has been valuable in providing a method for delimitation of transitional areas which is valid, applicable to the study of regional margins if the regions are determined by quantitatively measurable data and which provides a new approach to the understanding of the regional concept of geography. The analysis of the factors involved in the understanding of the character of the transition zone has provided additional information upon the climatic limitations of decreasing precipitation and increasing temperatures as corn is extended toward the wheat-sorghum core area in Kansas. The main limitation upon wheat as it is projected toward the Iowa-South Dakota corn-oats core was found to be economic competition from corn and oats in areas approaching the climatic optimum for wheat. Edaphic limitations upon the crops proved to be less significant than climatic and economic factors. Change in land use seemed to indicate a greater degree of maturation of agriculture practice as well as greater core specialization at the end of the study period, 1924-1954, than at its beginning.

Microfilm \$3.60; Xerox \$12.20. 278 pages.

LEYTE AND SAMAR: A GEOGRAPHIC ANALYSIS OF THE RURAL ECONOMIES OF THE EASTERN VISAYANS

(L. C. Card No. Mic 58-737)

Michael Perry McIntyre, Ph.D. The Ohio State University, 1951

The East Visayan Islands of Leyte and Samar, although the first two Philippine Islands to be discovered by Magellan in 1521, have remained through the years somewhat in the backwash of national development and relatively unknown to most Filipinos as well as to the myopic world at large. But with the Allied re-invasion of the Philippines in the Autumn of 1944, they were suddenly thrust into the public spotlight and our limited knowledge of things geographic on the two islands became embarrassingly apparent. This study attempts to fill in this longstanding hiatus. Its purpose is to present a geographic analysis of the physical, cultural, and regional characteristics in order to determine the proper place of Leyte and Samar in the overall economy and physical structure of the Philippines. Such a study can be of considerable practical value, for a complete knowledge of every part of the Archipelago is vital to those who expect to plot the course of Philippine independence in the years ahead.

Physically the two Islands come very close to being one, for the San Juanico Strait is only 200 feet wide at the point of nearest proximity. Similarly, Luzon is closely adjacent to northern Samar, and the mountains of the Surigao Peninsula in northern Mindanao are clearly visible from southern Leyte. Thus they are integral segments of the Philippine cordillera which sweeps down from northern Luzon through the eastern Visayans and Mindanao. This system in turn is only a part of a larger series of volcanic-island festoons or arcs which fringe the outer edge of the Asiatic continental shelf from the Kuriles to the East Indies.

The highland backbone of Leyte and Samar so dominates the landscape that it conditions every phase of life, acting as a barrier to onshore winds, forming a major hindrance to intra-island transportation, and seriously limiting the amount of land available for agriculture. In Leyte the mountains take the form of a high central range (3,000 to 4,000 foot peaks) in the north that effectively separates a broad northeastern plain from a smaller lowland fringing Ormoc Bay in the west; and lower mountains are in evidence from coast to coast in the southern half of the island and in the northwest peninsula. The highland block comprising the core of Samar, however, displays none of the well-defined cordilleran characteristics that are so evident in northern Leyte. Rather, it is a low and maturely dissected mountain mass that almost completely dominates the island. The only extensive lowland borders the north coast, but it is relatively narrow and scarcely one-third the size of the northeastern plain of Leyte. The higher mountains in both islands are resistant volcanics in the main, pushed up from below and breaching the thick sedimentaries which are found today along their flanks. Contact metamorphism of the sedimentary layers has been chiefly responsible for the occurrence of iron and chromium ores in southeastern Samar and for manganese ores in west central Leyte; and petroleum seepages among the sedimentaries of northwestern Leyte have led to the formation of a valuable rock asphalt and to considerable development work aimed at producing oil in commercial quantities.2

This mountainous terrain of Leyte and Samar, with its ranges oriented in a north-south direction, also exerts a significant influence on the climate of the islands. Strong winter winds flowing out of the intense Siberian high pressure cell approach the Archipelago from the northeast, and as they impinge directly upon the highlands, they are forced aloft and drop their moisture in the form of heavy rain along the east coasts. Precipitation in smaller amounts is carried over the mountains to the western side of the islands as well. During the opposite season, summer monsoon influences and the northward migration of the intertropical front, with its attendant deflected southeasterly trades, causes an airstream of limited velocity to strike the islands from the southwest, bringing heavy intermittent showers on the west coasts and light rains to the east. In addition to the major air currents, there are also the occasionally destructive typhoons moving in from the east during summer and autumn, and the northeast trades in the spring. As a consequence, not only is the rainfall total high each year (averaging in the neighborhood of 100 inches), but there is not apparent anywhere on Leyte or Samar a really dry season, of the kind so characteristic of most of the rest of the Philippines and monsoon Asia.

It is on the basis of the quantity and the distribution of precipitation that any valid climatic classification must be deduced; for temperatures, excepting slight changes with altitude, are essentially the same throughout the year, hovering close to an 80 degree average for every month of the year. Therefore, the official classification of climate is the one advanced some years ago by José Coronas, former Chief of the Philippine Weather Bureau, who separates an eastern region in both Islands from one in the west. The eastern region is distinguished from the western, where precipitation is distributed fairly evenly throughout the year, by a winter rainfall maximum with a slightly greater annual total.

This constantly heavy rainfall, coupled with high temperatures, has had a marked effect upon the soils of Leyte and Samar. Percolating ground water has generally leached them of much of their natural fertility, whereas accelerated microbiotic activity has reduced the organic soil materials so that laterization plays an important role in soil formation. Only the regularly rejuvenated alluviums in the river valleys and delta plains retain their alkaline character.

The climax vegetation of dense Dipterocarp forest which once predominated over most of Leyte and Samar accurately reflect the acid soils and moist tropical climate of the environment, and it is still the major cover on the mountain slopes. It has been considerably modified, however, by human activity. In the plains, most of the land is cleared and cultivated, whereas scattered regions of secondary forest and cogon grass are common in the highlands, where the forest has been removed by commercial lumbering operations or the fires of the migratory agriculturalists, who clear successive patches in the jungle and abandon each after a short period of cultivation.

These then — physiography, insularity, climate, soils, and vegetation — are the physical factors of Leyte and Samar within whose limits the people of the Philippines must work and try to achieve cultural advancement. The native people have experienced a long and turbulent history marked by invasions of exotic cultures and mass migrations of whole populations. Indian and Chinese elements in their present-day institutions and cultures attest to ancient infusions from these distant centers of civilization;

and the coëxistence of obviously differing racial groups living side by side is viewed as evidence of large-scale population movements into the islands. Actually, representatives of only the last wave of these prehistoric racial migrations, the Malaysians, are now found in Leyte and Samar. Traces of their predecessors and close relatives, the Indonesians, and the supposedly indigenous inhabitants, the Negritos, are missing here, although both of these groups are present in most other Philippine Islands.⁵

Then came the Spanish, with their swords and their friars, and for over 400 years the Philippines were subject to their petty greed for the riches of the islands and a zealous campaign for religious converts. They left their mark — one of the most indelible and determinative in Philippine history; but they were followed by the Americans whose benevolent policies and democratic ideals, superimposed on the medieval influences of Spain, produced a unique culture which is duplicated nowhere in the Orient. As a result, the modern Filipino is culturally distinct from his Malayan neighbors, for he is a curious blend of east and west.

The lower-class Filipino, the Tao or agricultural worker, is the average man of Leyte and Samar. He leads a typically gregarious and relatively primitive village life, displaying a happy-go-lucky attitude, although often in debt and receiving only a fraction of his rightful share of the returns from his productive efforts. Although his occupation, agriculture, is by all odds the dominant industry of the islands, it suffers from an excessive number of ills, many of which might be alleviated if the federal government would but recognize the fundamental position of agriculture in the national economy. Such major difficulties as tenancy, usurious rural credit, a needlessly involved marketing system, and a lack of scientific farming methods are all traceable to governmental disregard for agriculture and the farmer.

Rice is the outstanding food crop of both Leyte and Samar, although neither island is self-sufficient. Both could be, if irrigation were developed, or even if the natural rainfall were utilized and two crops instead of one were attempted each year; except in certain small districts of Leyte where irrigation projects do exist, the usual practice is to allow the fields to lie fallow for a large part of the year. Corn in Leyte is an exceedingly important food crop, too, especially in the west, but much of it is shipped to Cebu, and expensive rice is imported to take its place. Samar grows very little corn. Sundry vegetables and fruits are raised on most farms, notably camotes, gabi, cassava, and bananas, but they supplement rice in the average diet to a much lesser degree than is recommended for optimum nutrition.

Growing side by side with the food crops on plantations and smaller farms are abacá, coconuts, and sugar cane, which depend almost wholly for their market on foreign outlets. They are a vulnerable element in the Island economy, for any disruption in foreign trade, the cause of which may be beyond the control of the Filipino, is likely to prove disadvantageous or even disastrous. And since most international commerce is with the United States, the forthcoming (1954-1974) gradual withdrawal of trade preferences could well have far-reaching effects.

Other industries in Leyte and Samar, include the major iron-mining operation near General MacArthur and the smaller enterprises near Biliti and Baybay. There is also the important fishing industry, the processing of local ag-

ricultural produce, and the small-scale manufacture of myriad goods for the home market. But manufacturing, like every other Island occupation, is distinctly secondary to agriculture.

Agriculture operates, as does all other human activity, within a set of physical limits, but it is also influenced by a number of economic and social limitations. The physical factors cannot, of course, be altered greatly, and therefore it is the changes that can be wrought in the existing social and economic forces that will allow agriculture and the general economy of Leyte and Samar, which is so heavily dependent on agriculture, to progress beyond its current rather lowly position. First, there must be some progress toward the elimination of the persistent and basic agrarian problems, such as tenancy, the involved marketing system, inadequate rural credit facilities, faulty land titles, and lack of scientific farming methods. Increased production should result immediately. Second, food crops should be diversified to broaden and balance the diet, and others, like cotton, should be introduced to lessen the dependence on costly foreign commodities required in the everyday life of the Filipinos. Third, a certain amount of light industry might be encouraged, again to decrease reliance on foreign factories, and also to utilize local industrial raw materials and to establish industrial payrolls and create new sources of taxable wealth in the Islands. Fourth, export crops should be produced efficiently in order to lower their cost and increase their quality, for, with the loss of a privileged American market, foreign competition must be met on equal terms. A certain amount of retrenchment is inevitable, but both abacá fiber and copra are on the American free list and have a reasonable chance of survival. Finally, new exports should be developed, not only new commercial crops such as kapok or cacao, but fish products, forest products, and products of the mines.

To aid in the intimate understanding of local conditions in all parts of Leyte and Samar necessary for formulating a rational program to accomplish these aims, the islands may be divided into a number of natural regions. Each of these has its own peculiar problems which must be solved at the municipal or barrio level before provincial and national difficulties can be overcome.

Whether such an extensive program can be carried to a successful conclusion remains to be seen. Ever since World War II, the federal treasury has suffered from a severe case of fiscal anemia; but with the help of the United States, which is greatly concerned with the solvency of these strategic islands, it is not improbable that eventually Leyte and Samar may achieve the desired reforms and contribute their share to the economic prosperity of the new Philippine Republic.

Microfilm \$5.45; Xerox \$19.40. 426 pages.

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POLITICAL REGIONALISM IN NEW YORK STATE 1860-1954

(L. C. Card No. Mic 58-7229)

Edward Jervis Miles, Ph.D. Syracuse University, 1958

Supervisor: Clyde P. Patton

Upstate New York has not always been the Republican stronghold it is today. Since 1860, when the Republican and Democratic Parties first vied for the governorship, there has been a considerable change in the pattern of voting allegiance in New York State. This change, although clearly discernible in terms of the percentages of votes for each party, is more markedly dramatized when it is calculated on the basis of the number of political units—towns and cities—that have shifted their political allegiance. On the basis of this latter method, there has been a very marked decline in areas of Democratic allegiance in the state. Since New York City accounts for only five political units, it is obvious that the shift has taken place upstate. It is the aim of the study to answer these questions: where, when, and at what rate have these changes taken place.

The three major political regions that exist today in New York State have existed since 1860 with essentially the same boundaries. The regions, themselves, however, have undergone considerable change from one period to the next. The change in political allegiance has been a gradual but steady shift to the Republican Party in most sections of the state. Four major historical periods, based on the time and the degree of the switch to Republicanism, have been established. At the present time, in addition to the three major political regions, a small zone of transition exists.

Each of the four distinct periods of Republican Party development represents an increase in strength and/or an expansion in areal support. Each succeeding period is separated from its predecessor by a brief interval, often just one election, of Democratic ascendancy. The four Republican Periods and the Democratic intervals are:

Period One 1860-1879
Democratic Interval 1882
Period Two 1885-1908
Democratic Interval 1910-1912
Period Three 1914-1928
Democratic Interval 1930
Period Four 1932-1954

A chapter in the dissertation has been devoted to each Republican Period and to each Democratic interlude. Maps of Strength and Consistency of Party Allegiance and Change in Party Allegiance from one major period to another have been drawn. The eighteen maps represent the major contribution of the study. The regional boundaries as they existed for each period have been drawn on these maps. In general, the regional boundaries divide the state into

three roughly equal parts. The Western Region occupies an area west of a line from the City of Watertown to Oneida Lake to just south of Utica to the place where the Delaware River becomes the boundary between Pennsylvania and New York. Another line following the northern boundary of Otsego, Delaware, Albany and Rensselaer Counties separates the Northern Region from the Southeastern Region. The transition zone of the present day, mentioned above, exists between the Western and Southeastern Regions.

The political regions and historical periods were developed from the voting returns for each of the forty gubernatorial elections between 1860 and 1954 for each of the one thousand and fifty-seven political units (cities and towns) in the state.

The central theme and focus of the study are the areal patterns of strength, consistency, and change in voting behaviour in New York State between 1860 and 1954. The eighteen maps have their special value in revealing the areal distribution of party inertia or dynamism. This focus on area, specifically differentiates a geographically conceived and oriented thesis, such as this one, from a study utilizing the same raw material but focusing on the history of political parties in the state.

Microfilm \$2.05; Xerox \$7.20. 154 pages.

A GEOGRAPHIC STUDY OF TOURISM ON THE COASTS OF SCHLESWIG-HOLSTEIN, GERMANY

(L. C. Card No. Mic 58-7239)

Ralph Gunter Shaffer, Ph.D. Syracuse University, 1958

Supervisor: Clyde P. Patton

This study deals with resorts and tourism on a seacoast, more particularly with resorts and tourism on the coasts of Schleswig-Holstein, the northernmost province or "Land" of Germany. The seaside resorts of this coast have many common features, but they also differ in many ways. Essentially, the problem was to analyze the differences between the North Sea and Baltic coasts by describing and classifying their resorts and the phenomena of tourism as found therein. This was done by tracing the historical evolution of tourism, followed by an inventory of its physical bases, a classification of selected seaside resorts, and, finally, an evaluation of functional resort structure.

From our investigations we conclude that:

- 1) Tourism came to the shores of Schleswig-Holstein over 160 years ago; it passed through three major historical phases, with the most rapid growth taking place between 1890 and World War I.
- 2) Differences between the physical environment of North Sea and Baltic coasts are especially marked with respect to shore types and hydrography. Truly wide, sandy beaches occur almost exclusively on the offshore islands of the North Sea in association with sand dunes, a large tidal range, and a heavy surf. Baltic beaches are narrower and receive only a very gentle surf, while tidal ranges are negligible.

3) All but two Schleswig-Holstein seaside resorts evolved from pre-existing settlement nuclei. Site appears to have been a more important determinant, since disadvantages of situation were readily overcome. Resorts with pre-existing settlement nuclei generate a progression of patterns and forms as they approach maturity:

Patterns: irregular → perpendicular → linear-rectangular

Forms: traditional → hybrid → foreign

Resorts without prior settlement nuclei usually display a linear-rectangular pattern in association with either hybrid or foreign forms.

4) North Sea resorts represent "purer" functional types and are more heavily commercialized than their Baltic counterparts. Similarly, tourism is denser and more intense on the North Sea coast, especially juvenile tourism. Hamburg, Nordrhein-Westfalen, Schleswig-Holstein, Niedersachsen, and West Berlin are the most important tourist source areas. Hamburg, Bremen, and West Berlin tourists are most strongly attracted by Schleswig-Holstein seaside resorts. Apparently, most German tourists prefer North Sea resorts to those on the Baltic.

Microfilm \$2.70; Xerox \$9.40. 207 pages.

A STUDY OF THREE FOX VALLEY CITIES IN ILLINOIS: LINEAR, ADJACENT, AND SATELLITE ASPECTS OF BATAVIA, GENEVA, AND ST. CHARLES

(L. C. Card No. Mic 58-7095)

Helen Leonore Smith, Ph.D. Clark University, 1958

In the western suburbs of metropolitan Chicago is a cluster of three urban centers of approximately equal size in population. Their pattern in a north-south line, straddling the Fox River, with Geneva and St. Charles in juxtaposition and Batavia only a short distance away, is unique; for their rank-size and spatial arrangement do not fit into the theoretical pattern for classification of hierarchy of settlements,

This study of the three cities examines their urban morphology and analyses the functions and problems of areal organization and activities, both externally and internally.

Among the major factors influencing white settlement during the pioneer period were soils, climate, and forests. These favored an agricultural surplus and encouraged the development of service centers for the surrounding region. Natural springs, water-power sites, and building stone functioned in fixing the city sites.

After an initial settlement pattern had been established, then cultural changes such as high-level industrial technology and freedom of movement through modern transport facilities challenged the ability of the three cities to adapt to new forces and functions. Nearby Chicago also was an influence.

During the transition period of development local residents demonstrated their ability to build and operate factories and to initiate and develop institutional and governmental services, which have exerted influence beyond their own localities.

Another phase of this study describes present-day population and land use patterns and the functional organization of industries and services.

These Tri-Cities are the fastest growing towns in Kane County, as the result of both natural accrual and inmigration. Over half of the in-migrants come from Chicago.

The residential function is of high quality and is supported by a higher-than-average amount and equitable distribution of public and semi-public land. Each city has its own CBD, and in Geneva there is a specialized trade in gift shops and tea rooms not usually found in small cities.

Each city has a main industrial district, and employment figures show that manufacturing is the most important economic activity. Professional and administrational services rank high in Geneva, and personal services in St. Charles.

Spatial relationships of the Tri-Cities, involving their market areas, reflect advanced technical levels in manufacturing, chiefly in making heavy machinery, electrical machinery, and furniture. The chief market is the Chicago-Milwaukee Industrial Region, with some goods shipped to the East and to foreign countries. Some retail service establishments and governmental or institutional organizations have mainly a state-wide market.

Altogether, more than four-fifths of the employees in the Tri-Cities are engaged in "city forming" or "basic" activities. Tables show that for every 100 persons supplying an outside market there are only 19 persons serving the local market. This high proportion of basic workers tends to support the hypothesis that small cities have higher basic components than large cities.

Other tables show that residential services comprise an important spatial relationship. Of the 25 per cent growth during the last decade 18 per cent was due to an inflow of people--mainly from Chicago.

Chief among the relationships of the Tri-Cities with their areas of supply are the in-movement of commuters and of raw materials. Two-thirds of the industrial workers are commuters from Aurora, Elgin, Chicago suburbs, and surrounding rural regions.

The heavy interchange of goods, services and people moves on efficient transport facilities: highway, railway, and airway.

This investigation of the origin of the Tri-Cities, the cultural factors encouraging continued development on their present sites, and their role in the industrial development of suburban Chicago has contributed to the understanding of a trend in America today, where increasing numbers of people are living in urban environments.

Microfilm \$2.80; Xerox \$9.60. 215 pages.

GEOLOGY OF THE BARQUISIMETO AREA, VENEZUELA

(L. C. Card No. Mic 58-7826)

Jess Richard Bushman, Ph.D. Princeton University, 1958

The Barquisimeto area is located in northwestern Venezuela where the Andes join the Coast Range of Venezuela.

Regional metamorphism is evident in the older rocks of the area, which range from Cretaceous to Paleocene in age. Late Tertiary and Quaternary rocks rest unconformably upon the older rocks in scattered outcrops throughout the area.

The Barquisimeto fault, a major right lateral strikeslip fault has divided the map area, of approximately 1200 square kilometers, into two distinct provinces. The displacement along the fault is more than 30 kms.

The northern province has experienced less metamorphism than the southern province and it was possible to correlate the formations there with stratigraphic sections measured farther to the west at Curarigua and Barbacoas, in areas not so greatly disturbed by folding and faulting.

The Cretaceous rocks in the northern province are divided into the Rio Turbio, Carorita, Barquisimeto, and Barure formations. The Rio Turbio limestones; the quartizitic sandstones, shales, and limestones of the Carorita formation; and limestones, marlstones, shales (many altered to phyllites), and cherts of the Barquisimeto formation are similar in many respects to the Cretaceous formations found elsewhere in western Venezuela. Starting in Barquisimeto time the conditions of sedimentation began to change. The Barure formation is quite distinct from other Upper Cretaceous sediments in western Venezuela.

At the close of Cretaceous time the sedimentary basin was deepened and along its unstable margins large blocks of Cretaceous limestones and igneous and metamorphic rocks became incorporated into the sediments as a result of slumping, sliding, and turbidity currents that moved the material down into the basin, resulting in the Pavia boulder bed facies. This condition reoccurred at different times in the Paleocene and Eocene, although it is not reflected in the Loma de Leon formation, which, in the map area, shows more normal deposition of muds and sands. The next period of deposition recorded in the Barquisimeto area is one of brackish water conditions in Miocene or Pliocene time, when the Guamacire muds and sands were deposited.

Gravels of the El Pegon formation (Pliocene?) and widespread alluvial gravels of Pleistocene and Recent age indicate that uplift and erosion marked the close of Tertiary time and have continued on to the present.

In the southern province there are low grade sericitic, quartzose schists, calcareous schists, limestones, graphitic schists and phyllites in the Los Cristales formation. Massive limestones and a few quartzite beds occur in the Rio Abajo formation. These rocks are very similar in appearance to the metamorphic rocks of the Caracas group

exposed in the Coast Range. The Yaritagua formation, which is the oldest in the metamorphic sequence consists of gneisses, porphyroblastic gneisses, and schists; and is probably equivalent to the Las Brisas formation of the Caracas group.

No fossils were found in the metamorphic rocks of the southern province but lithologic similarities and stratigraphic position suggest that they are equivalent to the less metamorphosed rocks of Cretaceous age in the northern province.

Metamorphism increases from west to east on both sides of the large fault. In the northern province the metamorphism grades from beds that have been dated as Cretaceous with ammonites and other fossils, into schists and limestones showing the same degree of metamorphism as that found in the southern province.

The regional metamorphism in the western part of the northern province is very low grade. Many of the calcareous shales and marlstones of the Barquisimeto formation have been altered to sericitic porphyroblastic phyllites. The porphyroblasts have been identified as the mineral pumpellyite.

Serpentinized ultrabasic igneous rocks and green schists are found in the southern province. The ultrabasic igneous rocks were intruded into beds of the Los Cristales formation prior to or during the regional metamorphism.

Compression from the northwest has produced considerable shearing and thrusting in the western part of the area. The axes of the major folds trend N 45° to N 70° E, and many plunge to the southwest. There are several important fault trends but the most prominent trend is N 60° E which is the direction of the large Barquisimeto strikeslip fault.

Movement along this fault has effected the orientation of structures in the map area as is shown by the regional drag south of Yaritagua.

Microfilm \$2.85; Xerox \$9.80. 218 pages.

PENNSYLVANIAN PALEOTECTONICS OF THE COLORADO PLATEAU

(L. C. Card No. Mic 59-707)

Richard Walter Fetzner, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor L. M. Cline

During the Pennsylvanian interval of time, the Colorado Plateau area underwent the most active period of tectonic activity of the Paleozoic and Mesozoic eras. Sediments that resulted from this activity present the most diverse lithologic types encountered in the entire stratigraphic section of the area. From stratigraphic and lithologic data acquired from 172 control points, the paleotectonic

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relationships of the Pennsylvanian period have been reconstructed. This was accomplished through the use of isopach maps, lithologic ratio maps, vertical sandstone distribution maps, field evidence, and paleontological data.

The Pennsylvanian tectonic elements of this area defined a parageosyncline that was occupied by a continuous seaway. Greatest submergence occurred in the north where the Paradox Salt Basin formed. To the south, depositional centers formed in the ancestral San Juan Basin and the Lucero Basin. This seaway opened northwest into the rapidly subsiding Oquirrh Basin, northeast into the Colorado Trough, southeast into the southern Colorado Trough, and southwest into the Sonora geosyncline. The seaway was bounded to the northwest by the Emery Uplift, to the northeast and east by the Uncompangre and Santa Fe Uplifts, and to the west and southwest by the Kaibab-Zuni Uplift. The Defiance Uplift, a structural subsidary of the Kaibab-Zuni lineament, projected north into the Paradox Salt Basin where it strongly effected depositional patterns during Pennsylvanian time. The Penasco Uplift existed in the southern part of the seaway and partially separated it into two depositional basins.

None of these structural elements were tectonically contemporaneous, and each had different influences upon Pennsylvanian sediments. Throughout most of Pennsylvanian time, the Emery Uplift was a low, partially submerged, structural arch. A southeastern spur of tectonism, probably island-like in composition, affected Desmoines through Virgil sediments within the Paradox Salt Basin. The Uncompangre Uplift experienced earliest and greatest Pennsylvanian tectonism in its southern portion. It became positive in lower Desmoines time, remained strongly positive into the Permian, and shed a tremendous, coarse clastic delta to the southwest. The northwestern Uncompangre responded to uplift later in Pennsylvanian time, and may have permitted marine access between the Eagle and the Paradox evaporite basins during Desmoines time. Consequently, Paradox evaporites may be the product of two evaporite basins. The Santa Fe Uplift, which was slightly positive in pre-Pennsylvanian time, did not respond to sharp uplift until late in Pennsylvanian time. The Penasco Uplift underwent early and late Pennsylvanian tectonism, but had less areal effect on Pennsylvanian lithofacies than any other tectonic feature in the area. The Kaibab-Zuni Uplift was tectonically continuous throughout its extent. It underwent epirogenic uplift in early Pennsylvanian time and remained mildly positive into the Permian. Progressive marine offlap occurs on all sides. The Defiance Uplift was probably positive in Mississippian time and underwent successive periods of tectonism in Atokalower Desmoines, late Desmoines, and late Pennsylvanianearly Permian times. Major hydrocarbon production in the Four Corners area displays close relationship to this

Within the Paradox Salt Basin, greatest submergence occurred adjacent to the Uncompander Uplift. A thick sequence of evaporites formed due to static barriers on all sides of the basin. The Emery and Uncompander uplifts created restriction to the northwest, north, and east, and the Kaibab-Zuni Uplift created restriction to the southwest. The combination of a clastic barrier projecting into the southern basin from the northeast, and the Defiance Uplift projecting into the southern basin from the southwest formed a nearly continuous static barrier across the southern Paradox Salt Basin. Breaching or subsidence of the

barrier permitted periodic reflux of dense, lower brines, and permitted cyclical evaporitic sedimentation within the basin. Microfilm \$3.55; Xerox \$12.00. 275 pages.

COILED PENNSYLVANIAN NAUTILOIDS OF NORTH AMERICA

(L. C. Card No. Mic 58-2963)

Robert H. Hansman, Ph.D. State University of Iowa, 1958

Chairman: Professor W. M. Furnish

Coiled nautiloids are widely distributed in the marine Pennsylvanian of the United States. They are better known in the Middle and Upper Pennsylvanian than in the lower part of the system. Geographically they are most abundant and varied in the Midcontinent region and to a less extent in the Rocky Mountain region, the Eastern Interior region, and the western part of the Appalachian region. It is evident that most Pennsylvanian coiled nautiloid genera have a wide geographic distribution but a long stratigraphic range. Most individual species seem to be rare or uncommon; they are generally known only locally, both geographically and stratigraphically.

The shape and surface features of the conch show great variety; all of them, however, possess orthochoanitic sinhuncles

Altogether about eighty species of coiled nautiloids are known from the Pennsylvanian of North America. On the basis of the shape of the conch and of the sutures and the nature of the surface "ornamentation", these can be grouped into six families: (1) the Koninckioceratidae, which includes Koninckioceras, Knightoceras, and Endolobus; (2) the Domatoceratidae, which includes Domatoceras, Stearoceras, Titanoceras, and Stenopoceras; (3) the Tainoceratidae, which includes Tainoceras, Temnocheilus, Foordiceras, and Metacoceras; (4) the Liroceratidae, which includes Liroceras, Coelogasteroceras, Condraoceras, and possibly Acanthonautilus; (5) the Ephippioceratidae, which includes Ephippioceras and Megaglossoceras; and (6) the Solenochilidae, which includes only Solenochilus.

Microfilm \$6.30; Xerox \$22.00. 494 pages.

LATE CRETACEOUS - EARLY TERTIARY STRATIGRAPHY OF NEW JERSEY

(L. C. Card No. Mic 58-7873)

Richard Keith Olsson, Ph.D. Princeton University, 1958

A study of the latest Cretaceous-earliest Tertiary formations of the New Jersey coastal plain, in surface exposures and in wells, has led to the following:

An analysis of five lithic units: Navesink, Redbank, Tinton, New Egypt, and Hornerstown formations. Of these the New Egypt formation is newly recognized and named, and the Redbank formation is divided into two new members, the Shrewsbury and Sandy Hook. Of these units, the New Egypt formation of the outcrop area (New Egypt and Sewell) is a lateral equivalent of the Tinton formation of northern New Jersey, and in the subsurface (Whitesville and Glendola wells) the New Egypt formation represents both the Tinton and Hornerstown formations.

Four planktonic foraminiferal zones are recognized and three benthonic faunas are described:

The zone of Rugoglobigerina jerseyensis n. sp. - Globorotalia monmouthensis n. sp. characterizes the Redbank sand and the lower part of the New Egypt sand; it is believed to be post Navarro-preTertiary in age, possibly equivalent to the latest Maestrichtian, Abathomphalus mavaroensis zone of Trinidad. The early occurrence of Globorotalia (heretofore known only from the Tertiary) emphasizes the very late Cretaceous age of this zone.

The zone of Globorotalia compressa - Globigerinoides daubiergensis, present in the basal part of the Hornerstown greensand and in the basal part of the upper New Egypt sand (subsurface) is correlated with the Early Paleocene lower Midway group (Kincaid, Wills Point, Clayton formations) of the Gulf Coast and the type Danian of Denmark.

The subzone of Globorotalia pseudobulloides of the Globorotalia angulata zone, characterizing the middle parts of the Hornerstown greensand and upper New Egypt sand (subsurface), is correlated with the Late Paleocene upper Midway group (Naheola and Porters Creek formations) of Alabama and the Thanetian of England.

The subzone of Globorotalia velascoensis - Globorotalia acuta - Globigerina spiralis is present in the upper parts of the Hornerstown greensand and upper New Egypt sand (subsurface). However, only the oldest part of this subzone, in which the G. acuta type has not yet appeared, is represented. This fauna, not reported outside of New Jersey, is believed to be Early Eocene in age (equivalent to part of the nonmarine Sparnacian of Europe).

Benthonic foraminiferal faunas were found in the Redbank, New Egypt, and Hornerstown formations and these are compared with Gulf and Atlantic Coastal plain faunas.

The Cretaceous-Tertiary boundary is marked by spheroidal weathering at the surface in the northern part of the outcrop area (Tinton and Hornerstown formations), but apparently lies within a lithic unit in the subsurface (New Egypt sand) and deposition appears to have been unbroken here.

The Paleocene-Eocene boundary also lies within a lithic unit (Hornerstown and New Egypt formations).

Microfilm \$4.55; Xerox \$15.20. 354 pages.

A PETROGRAPHIC AND X-RAY STUDY OF THE DOLOMITE DISTRIBUTION IN CERTAIN CAMBRO-ORDOVICIAN LIMESTONES OF CENTRAL AND SOUTH-CENTRAL PENNSYLVANIA

(L. C. Card No. Mic 59-38)

Louis Eugene Rieg, Ph.D. University of Pittsburgh, 1958

The dolomite distribution in certain of the Cambro-Ordovician limestones of central and south-central Pennsylvania was studied petrographically and by x-ray analysis in order to ascertain the origin of the dolomite and explain its distribution. Three basic types of distributive

patterns were recognized and described: progressive, selective, and differential.

Progressive dolomitization was described as a continuous process, passing through incipient, group, coalescent, and terminal stages. This type of dolomitization occurs mainly in 4-inch to 6-foot interbeds in the limestone formations, and is basically absent in Ordovician formations above the Chazy series. Progressive dolomitization yields higher amounts of MgCO₃ in solid solution in dolomite and calcite in the carbonates studied. This factor has been interpreted as indicative of a higher energy diagenetic environment for dolomite crystallization. Similarity of MgCO₃ content in the dolomite in dolostone and limestone portions suggests common origin.

Selective penecontemporaneous dolomitization, occurring in layered or tubular structures, can be the result of either organic or inorganic influences. The tubular structures (possibly organic) and algal structures analysed have a slightly higher MgCO₃ content in the dolomite than the inorganic layered structures. The organisms themselves may have contributed Mg++ in addition to that supplied by the sea waters. Tubular structures were not seen in formations older than the Warrior limestone.

Pebbles with varying dolomitization patterns and Mg++ concentrations were observed in matrices which had experienced progressive dolomitization. The dolomite in the pebbles is interpreted as being inherited from the parent rock. Their relative stability in this environ, and the contemporary instability of the matrix suggests progressive dolomitization according to degree of lithification. That is, after a given stage of lithification, diagenetic dolomitization cannot occur.

Tectonics, the ultimate control of sedimentation, governs micro- and strata-dolostone growth by way of marine chemistry. Microfilm \$2.05; Xerox \$7.20. 155 pages.

GEOLOGY OF THE SPRINGERVILLE-ST. JOHNS AREA, APACHE COUNTY, ARIZONA

(L. C. Card No. Mic 58-5088)

George Keith Sirrine, Ph.D. The University of Texas, 1958

Supervisor: Professor Ronald K. DeFord

A detailed map of approximately 1,000 square miles on the southern margin of the Colorado Plateau shows outcrops of sedimentary strata of Permian, Triassic, Cretaceous, Tertiary, and Quaternary age. The Eager (Upper Cretaceous-Paleocene) and Richville (late Pleistocene) formations and the Summers member of the Mesaverde Sandstone (Upper Cretaceous) are named. Quaternary basalt, plus several cinder cones, covers much of the southwestern part of the area. At least five stages of extrusion took place. Extensive travertine deposits ranging in age from late Pleistocene to Recent occur in more than 100 square miles of the north-central part of the area. The simple structure is mostly homoclinal, interrupted in places by predominantly northwest-trending, late-Laramide anticlines and synclines. Three anticlines are eroded to expose San Andres Limestone (Permian); a fourth contains the southernmost outcrop of Chinle (Triassic) on its crest. Six late-Pleistocene erosion surfaces and five different gravels are recognized.

Microfilm \$3.55; Xerox \$12.00. 273 pages.

HEALTH SCIENCES

HEALTH SCIENCES, GENERAL

OBSERVATIONS ON THE DIGESTIVE ACTIVITY OF HUMAN GASTRIC JUICE

(L. C. Card No. Mic 58-7414)

John Francis Perry, Jr., M.D., Ph.D. University of Minnesota, 1958

Human gastric juice obtained under a variety of clinical conditions has been assayed for acid-proteolytic activity. Measurements have been made of the hydrochloric acid content, pH, and pepsin concentration and digestive effects of the juice for a living substrate have been determined. Titration with NAOH was utilized for measurement of acid; pepsin was assayed by the hemoglobin substrate method of Anson and Mirsky. pH measurements were carried out with the glass electrode. Perfusion of the esophagus of anesthetized cats with gastric juice was carried out under constant conditions and resultant digestion of the organ at the end of two hours noted. Investigations have been carried out utilizing the gastric juice of patients with no evidence of gastrointestinal disease as controls. Comparisons have been made with gastric juice obtained from patients with active duodenal ulcers, gastric ulcers, and gastric cancer; in addition specimens obtained from patients in various stress states have been analyzed in the same manner. Duodenal ulcer and certain stress states were shown to be associated with significant increases in the digestive activity of the gastric juice for living mucous membrane. Measurements of gastric pepsin suggest that the enhanced digestive action found under these conditions is due to increased concentrations of this enzyme. Duodenal ulcer and certain stress ulcers appear to be the result of this increased proteolytic activity of gastric juice. Significant increases in proteolytic activity of gastric juice were not demonstrated for gastric ulcers.

Data from patients with untreated duodenal ulcers as described above have provided baseline information which has been compared with results of analysis of gastric juice collected from patients after several types of operations for duodenal ulcer. The observed clinical success of an operative procedure could be correlated with the degree that reduction of acid proteolytic capacity of the gastric juice had been achieved. Persistence of high acid peptic activity of gastric juice after operation was usually associated with recurrent ulcers. Evaluation of gastric juice in this manner offers a means of evaluating the expectancy of success of procedures designed for control of duodenal ulcers.

Microfilm \$2.00; Xerox \$4.60. 86 pages.

STUDIES IN GASTRO-INTESTINAL ULCERATION WITH SPECIAL REFERENCE TO THE EFFECT OF GASTRIC JUICE ON GASTRIC MUCOSA

(L. C. Card No. Mic 58-7415)

Robert Wallace Toon, M.D., Ph.D. University of Minnesota, 1958

Adviser: Owen H. Wangensteen, M.D.

The effect of continuous exposure of gastric mucosa to pure gastric juice obtained from vagally innervated total gastric pouches was studied in dogs. In dead dogs continuous perfusion produced perforation of all stomachs within 150 minutes and the time of perforation appeared to be related to the time of death. Similar perfusion in living animals under anesthesia failed to produce significant mucosal injury in 36 hours.

Auto-perfusion was carried out in 20 living dogs by placing 200 cc. of pure gastric pouch juice into their iso-lated vagally innervated stomachs. The stomachs were drained and 200 cc. of test juice replaced every 12 hours. Gastric erosions appeared after 4 days. After 14 days or more eighty per cent developed gastric ulcers which in the main was histologically chronic and most frequent in the antrum. Sixty per cent of the ulcers perforated.

During this Auto-perfusion the stomach continued to secrete. The volume of nocturnal secretion was twice that of daytime secretion. Free acidity was consistently reduced during perfusion and the degree of reduction was directly related to the initial free acidity of the perfusion solution. There appeared to be a critical value of initial free acidity of about 100 clinical degrees below which the HCl content increased and above which the HCl content decreased during Auto-perfusion.

In a second series of experiments it was found that drainage of all the duodenal contents into total gastric pouches with vagal innervation intact effectively reduced the acidity of any gastric juice secreted by those pouches. Ulceration of the gastric mucosa did not occur under these circumstances.

In a third series of dogs the gastric antrum was resected and total duodenal contents drained into the residual gastric pouch. Alimentary continuity was restored by endto-end gastro-jejunostomy. With a short afferent loop (30 cm.) no stomal ulceration occurred within 60 days. With a long afferent loop (75 cm.) stomal ulceration occurred in forty per cent of animals. When transthoracic vagotomy was added no ulceration occurred regardless of afferent loop length. Irrespective of afferent loop length and the presence or absence of vagotomy, antral resection plus complete intragastric drainage of duodenal contents did not protect against the histamine in beeswax induced ulcer. All of eight animals subjected to histamine stimulation were dead of jejunal stomal ulceration within seventeen days. Perforation occurred in seven and massive hemorrhage in one animal. Gastric atony was a constant finding in vagotomized animals. Microfilm \$2.00; Xerox \$5.00. 98 pages.

THE FATTY ACIDS OF BLOOD AND ATHEROMATOUS PLAQUES AND THEIR RELATION TO ATHEROMA FORMATION

(L. C. Card No. Mic 58-7413)

Naip Tuna, M.D., Ph.D. University of Minnesota, 1958

It has been suggested that atherosclerosis may be due to essential fatty acid deficiency or that the saturated fatty acids, by virtue of their relative insolubility, may deposit preferentially in the arterial wall, thus playing a special role in the development of atherosclerosis. In an attempt to settle this question the following studies were done: 1-The plasma polyunsaturated fatty acids of eleven normal persons and nine persons with myocardial infarction were determined by alkali isomerization method (Table I). 2-The fatty acids of the total lipids and the cholesterol esters of normal plasma and atheromatous plaques were investigated by counter-current distribution, determination of iodine value, alkali isomerization, gas-liquid chromatography and paper chromatography before and after hydrogenation. The fatty acids demonstrated in both plasma and plaques were:

- a) saturated fatty acids: lauric, myristic, palmitic, stearic and arachidic.
- b) unsaturated fatty acids: palmitoleic, oleic, linoleic, arachidonic, C₂₀ with two and probably more double bonds, C₂₂ with unknown number of double bonds, and probably linolenic and palmitolinoleic acids. Fatty acids of unknown chain length with five and six double bonds were also present.

TABLE I

A- Plasma Polyunsaturated Fatty Acids of 11 Normal Persons:

	Diene %	Triene %	Tetraene %	Pentaene %	Hexaene %
Mean:	18.9	0.6	5.6	1.1	1.5
Range:	17.8-20.0	0.3-0.9	4.8-6.4	1.0-1.2	1.1-2.0

B- Plasma Polyunsaturated Fatty Acids of 9 Persons with Myocardial Infarction:

Mean:	18.6	0.6	5.3	1.0	1.3
Range:	17.7-19.4	0.3-0.9	4.9-6.2	0.8-1.4	1.1-1.7

The linoleic acid content of cholesterol esters was found to be higher than that of total lipids, both in blood and plaques. (Table II)

Neither qualitative nor gross quantitative differences were found between the total fatty acids of normal plasma and atheromatous plaques.

The linoleic acid content of cholesterol esters of normal plasma was found to be higher than that of atheromatous plaques. The reverse was found for oleic acid. The significance of this difference is unknown.

No significant differences were found between the plasma polyunsaturated fatty acids of normal persons and persons with myocardial infarction.

The data presented were interpreted as not favoring the

TABLE II

Summary of Fatty Acid Composition of the Various Lipids Studied*									
Source of Fatty Acids	% Tetradecanoic ("Myristic")	% Hexadecanoic ("Palmitic")	% Hexadecenoic ("Palmitoleic")	% Octadecanoic ("Stearic")	% Octadecenoic ("Oleic")	% Octadecadienoic ("Linoleic")	% Octadecatrienoic (*Liolenic*)	% Eicosatetraenoic (*Arachidonic*)	% Eicosanoic Eicosanoic Eicosadienoic ("Arachidic")
Normal Plasma	2.3	19.5	6.9	5.6	36.5	22.7	Trace	6.1	0.3
Plaques	1.3	14.8	5.6	4.4	32.1	22.9	Trace	7.6	0.6
Cholesterol Esters (normal plasma)	1.0	12.4	4.8	X,	23.8	46.2	Trace	6.3	X ₂
Cholesterol Esters (plaques)	0.6	9.1	6.8	X3	34.5	38.3	Trace	9.7	X ₄

 $X_1 + X_2 = 2.8\%$

*Data obtained by counter-current distribution and gas-liquid chromatography.

idea that atherosclerosis develops as the result of essential fatty acid deficiency (although would not entirely exclude it) nor the concept that saturated fatty acids are deposited preferentially in the arterial wall.

In spite of the striking similarities between humans and different animal species in regard their response to feeding large amounts of saturated and unsaturated fats, it is suggested that the findings in animals regarding atheroma formation cannot be used to explain entirely the atheroma formation in humans.

Microfilm \$2.00; Xerox \$4.60. 88 pages.

HEALTH SCIENCES, NURSING

STUDENT ACHIEVEMENT IN AN EXPERIMENTAL COURSE IN PSYCHIATRIC NURSING: AN ANALYSIS OF STUDENT MASTERY OF CONTENT, UNDERSTANDING OF PRINCIPLES, AND CLINICAL PERFORMANCE IN PSYCHIATRIC NURSING IN AN EXPERIMENTAL TWO-YEAR BASIC CURRICULUM

(L. C. Card No. Mic 58-5920)

Ruth V. Matheney, Ed.D. New York University, 1958

Chairman: Professor John C. Payne

The new associate degree programs in nursing education are designed to prepare nurses for beginning positions in all clinical areas. This study constitutes an analysis of student achievement in psychiatric nursing in one such program, with the objectives of content mastery, knowledge of principles, and the ability to give nursing care to psychiatric patients selected for measurement.

The psychiatric nursing course, the last in the program, included four hours lecture and sixteen hours clinical practice per week for eight weeks. The student group was composed of the first two classes, fifty-two students, who completed the program. In regard to age, educational background, previous experience, potential academic ability, and marital status, the group was characterized by a wide range of variability.

The instruments used to measure student achievement in psychiatric nursing were: course grades, including comparable pre-test and final examination; the National League for Nursing Achievement Test in Psychiatric Nursing; the State Board Test Pool Examination; a sampling of student application of principles of care during the first and last two weeks of the course; a thirteen-item ability check list used during the first and the last two weeks of the course; student and instructor anecdotal records, based on the most and the least satisfactory experience during each clinical assignment; and instructors' narrative summaries of student clinical performance.

Demonstrating a significant difference between means on pre-test and final examination, all students passed the course in psychiatric nursing with the majority of grades being "C" or better. On the National League for Nursing Achievement Test, approximately three-fourths of the students were above the seventy-fifth percentile, compared with students in all programs, with two-fifths above the same percentile rank compared with students in degree programs. All students passed the State Board Examination in Psychiatric Nursing, with a school standard score above national and state means. As rated by instructors, students showed a significant difference between the ability to apply principles of psychiatric nursing and in eleven abilities on the check list in the first two weeks and the last two weeks of the course. On these measures at the end of the course, instructors rated students as effective in applying principles in the majority of instances observed and rated the group on the ability check list as approximately eighty per cent average or better in comparison with expected beginning graduate performance. On student and instructor anecdotal records, both groups indicated predominantly satisfaction with student performance in giving patient care, although satisfaction was greater in some areas of activity than others. Instructor narrative summaries of student clinical performance contained a six-to-one ratio of favorable to unfavorable comments.

The students studied were able to achieve the objectives that were investigated in the course in psychiatric nursing. They compared favorably with students in other types of basic programs on a national achievement test and on state board scores. Not only were they able to meet the requirements for admission to practice as registered nurses, but also, as indicated by the evaluation of their performance by instructors, they were ready for graduate practice in beginning positions in psychiatric nursing. The student study group demonstrated greatest competence in the areas of acceptance and permissiveness, promotion of socialization, providing emotional release, meeting patient requests, and establishing communication. The most difficult areas of attainment for students were the development of self-understanding, insight into behavior, and understanding of the psychiatric nurse's role. The study indicates that it is possible to introduce major variations in a course in nursing, such as content, time, teaching methods, use of clinical practice, and still have students achieve objectives acceptable to the profession.

Microfilm \$2.75; Xerox \$9.60. 212 pages.

A STUDY OF THE USE OF THE RESULTS OF THE PRE-ENTRANCE PSYCHOLOGICAL EXAMINATIONS IN THE COUNSELING OF STUDENTS IN SELECTED SCHOOLS OF NURSING IN INDIANA

(L. C. Card No. Mic 59-85)

Winifred Ray Sink, Ed.D. Indiana University, 1958

Chairman: Louis G. Schmidt

The purpose of this study was to determine the extent to which the results of the pre-entrance psychological examinations were used in counseling students in basic professional schools of nursing in Indiana. An attempt was made, also, to determine the amount of preparation in counseling and guidance of those personnel who served as counselors for the students in these schools.

The 670 subjects were those students who had completed a consecutive three or four year program of basic professional nursing, had graduated from the schools of nursing in Indiana between June and August, in 1957, and had written the National State Board Test Pool Examinations in October and November of that year. From the standardized tests which had been administered to these students as pre-entrance tests, those items had been chosen for study which indicated potential strengths and weaknesses of nursing students. Those items provided clues for counseling the students.

The basic hypotheses were that the pre-entrance test results were not used to their full capacity for counseling students; that those faculty members designated as counselors in the schools of nursing were not adequately prepared in counseling and guidance to provide the help needed in the various problems confronting these students.

An interview guide was developed to include: areas for which the pre-entrance tests indicated clues for counseling nursing students; areas of the counseling and guidance programs of the nursing schools, which were pertinent to the use of the test results in counseling students; preparation of those personnel in counseling and guidance, who counseled the students.

Letters were sent to the directors of the nursing schools, requesting permission to visit the schools, to secure data. Data were obtained from 20 basic professional schools of nursing, by the personal interview technique, aided by the interview guide. The data were summarized by frequency distribution. Per cents were computed for the numbers of schools which had used the test results for counseling the students in the areas of remedial study, academic achievement, personal and social adjustment, planning for the future, and for the attrition, with its causes, in the schools. Per cents were computed for the amounts of counseling preparation of those personnel who served as counselors for the students.

Analysis of the findings revealed the following conclusions:

- 1. The results of the pre-entrance psychological examinations were not used to their full capacity, in the counseling and guidance of the students of the class of 1957, in the basic professional schools of nursing in Indiana.
- 2. Those schools which had close association with college counselors used the pre-entrance test results more

extensively for counseling students, than did those schools which did not have such associations.

- 3. The use of the pre-entrance test results as a counseling tool, by well-prepared counselors, seemed to be a factor in the personal adjustment of the students in the schools, which resulted in fewer drop-out students.
- 4. The use of the pre-entrance test results as a counseling tool, in the academic areas seemed to be a factor in the higher scholastic achievement of the students.
- 5. The majority of those faculty members in the schools, who were designated as counselors for the students, were not adequately prepared in counseling and guidance, to provide the counseling needed in the various problems confronting the students.

Microfilm \$2.00; Xerox \$5.60. 114 pages.

HEALTH SCIENCES, PHARMACY

AN INVESTIGATION OF SOME PHYSICAL FACTORS AFFECTING DRUG RELEASE FROM SOLIDS

(L. C. Card No. Mic 59-728)

James Albert Seitz, Ph.D. The University of Wisconsin, 1959

Supervisor: Associate Professor Dale E. Wurster

Within recent years a variety of solid doseage forms have been introduced with the intended purpose of increasing drug absorption, prolonging the physiological activity, or delaying the onset of the drug action. Regardless of the vehicle used to introduce the medicament into the body, after the solid drug has been released from the pharmaceutical system, the availability of the drug to the body is governed by the dissolutional rate. Since the preponderance of solids produced by pharmaceutical procedures and utilized in pharmaceutical systems are irregular and lack conformation to any geometric shape it would be useful to both pharmacy and medicine to know more concerning the rate of dissolution of these materials and the factors that influence this rate.

The variables of temperature, agitation, volume of solution, and viscosity were maintained constant and the rate of dissolution of isotropic crystalline masses containing artificially induced pores was experimentally determined by evaluating the dimensions and weight at given intervals during the dissolution. The dissolutional rate was determined by utilizing a special case of the Hixson - Crowell equation.

It was shown that both the internal and external surface of an irregular shaped particle had varying degrees of availability to a solvent depending on the properties of the liquid. In distilled water the pores of the particle were occluded by gases and the internal surface did not participate in the dissolutional process. However, in 0.2% sodium lauryl sulfate solution and when the particle has been suitably gas evacuated prior to introduction into the solvent all the surface participated. Due to a longer diffusional pathway and less agitation within the pores the amount of

dissolution from the internal surface was related to the distance the surface was located from the orifice of the pores.

When the rate of dissolution of powdered crystalline and lyophylized benzoic acid was studied, aggregation occurred so that dissolution was from the surfaces of the aggregates rather than from the desired measured surfaces of the individual particles. The use of a very soluble solid dispersing agent curtailed the occurrence of aggregation and greatly increased the rate of dissolution. Sodium lauryl sulfate solutions, likewise, facilitated dispersion of the fine powders with an observed increase in the dissolutional rate. The use of a solid dispersing agent was much less effective in 0.2% sodium lauryl sulfate solutions than was shown in distilled water.

Gas evacuation of fine powders prior to introduction into distilled water eliminated 'air trapping', but no increase in the rate of dissolution was observed.

Lyophylized powder exhibited a static electrical charge when the lyophylized aggregates were reduced to the primary particle size. The occurrence of the static charge, however, played only a minor role in reducing the dissolutional rate of this material.

Solvents used in lyophylization influenced the resultant particle size of powders, apparent density, and static charge on the surface of the powder. In spite of the differences in the particle size little differences in the dissolutional rate were observed. Lyophylization from an ethanolwater solvent system yielded a powder which possessed an excessive amount of static electricity and exhibited a slightly lower dissolutional rate.

Lyophylized benzoic acid existed in a metastable state and depending on the storage temperature reverted to a more stable form by a decrease in its specific surface area. When stored in an acetone-dry ice mixture or liquid air the particle size and dissolutional rate was not appreciably altered, but at room temperature it underwent a decrease in specific surface area with a resultant decrease in the rate. Microfilm \$2.40; Xerox \$8.40. 182 pages.

HEALTH SCIENCES, PUBLIC HEALTH

COMPARISON OF SEVERAL TESTS OF BLOOD PRESSURE REACTIVITY

(L. C. Card No. Mic 58-7782)

Richard Delleraine Remington, Ph.D. University of Michigan, 1958

A series of blood pressure stimuli are studied in an attempt to measure susceptibility to the development of hypertension (high blood pressure). Stimuli which are considered include the stress of initial measurement, cold applied to a hand, breath holding, exercise, CO₂ inhalation, and postural change.

The literature concerning these and several other tests is reviewed and criticized from a statistical point of view.

A standard series of stimuli is developed and applied to a group of four medical students. Stimuli in this series include cold, breath holding, CO₂ inhalation and exercise.

HISTORY

In an attempt to determine the significance of various sources of variation including variation between subjects, between tests, between various orders of administration of the tests, and variation from day to day, an experiment designed in the form of six randomly selected Latin Squares is carried out. The procedure does not show such extreme or capricious variation to make it unsuitable for further study.

A similar test series substituting a postural change for CO₂ inhalation is applied to 2 groups of children between the ages of 8 and 18, with 50 children in each group. One group is composed of children of hypertensive parents treated at the University of Michigan Hypertension Unit and the other a matching group of school children enrolled in the University of Michigan grade and high schools. The test series is composed of 32 determinations of blood pressure and 31 determinations of pulse rate on each subject.

The children of hypertensive parents show uniformly

and significantly higher mean systolic blood pressure levels than the school children, both for stimulated and unstimulated readings. The mean diastolic blood pressure levels for the 2 groups are quite similar throughout the test procedure. The mean pulse rates for the children of hypertensive parents are uniformly lower than for the control group.

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Analysis of the differences between stimulated and prestimulation readings reveals no significant differences between the 2 groups for the stimuli of cold, breath holding, exercise or initial reading. Postural change results in a difference between the groups with respect to change in systolic blood pressure. The fact that a more nearly basal blood pressure level was attained prior to the postural stimulus than for the other stimuli might be in part responsible for this finding. Techniques of linear discriminant analysis are used in analyzing the differences between the 2 groups. Microfilm \$2.00; Xerox \$6.20. 126 pages.

HISTORY

HISTORY, GENERAL

JOHN SLIDELL AND THE COMMUNITY HE REPRESENTED IN THE SENATE, 1853-1861

(L. C. Card No. Mic 58-7324)

Albert Lewie Diket, Ph.D. Louisiana State University, 1958

Supervisor: Professor T. Harry Williams

The career of John Slidell was much too prominent to be neglected by posterity. Yet, the scarcity of materials he left behind in his own hand has undoubtedly discouraged close investigations into the part he played in the political development of his country. To achieve its purposes, therefore, this study of Slidell's life between the years 1853 and 1861 has utilized one rather small collection of Slidell letters but has relied chiefly upon New Orleans newspapers and the Congressional Globe.

The dissertation fittingly opens with a brief sketch of Slidell's position in the world by 1853 and how he attained such a high estate, which embraced wealth, political power, and membership by marriage in a prominent Creole family. Included in the resume are mentions of the national attention he received from his participation in the "Plaquemines frauds" and his performance as the special minister of James A. Polk to Mexico, the prelude to the war of 1845. Along with the outline of Slidell's life previous to 1853 is a glance at the peculiar position of Louisiana as a part of America and the Cotton Kingdom. In 1853 Louisiana was just completing its change from a Whig stronghold to a state in which the strongest politicians were Democrats. Two of these were old enemies: Pierre Soule and Slidell. Ironically, it was Soule's acceptance of a Spanish ministry which gave Slidell his opportunity to achieve his longsought-after Senate seat.

Its background completed, the study then proceeds along

three general lines, each of which is connected with the other two. One deals with developments in Louisiana, economic and political. Economically, the state was especially concerned during the period with the baleful influence of Eastern-bound railroads on Mississippi-river traffic. Schemes, like the Tehuantepec route, were concocted to relieve the situation. Most failed. An outstanding success was the Jackson railroad. The feature of political trends in Louisiana at this time was their consistency. Slidell and the Democracy increased their statewide strength at the expense of their enemies. In New Orleans the American Party predominated.

Another part of this dissertation concerns Slidell's career as a national politician, which reached its climax in 1856, when he helped to put James Buchanan into the White House. Thereafter Slidell was among those conservatives who fought the free-soil movement within and without his party and finally decided that a Republican victory justified secession. These views brought Slidell a powerful enemy, Stephen Douglas. The intensity of the fight between Slidell's associates and Douglas's friends was attested to by the Brainard affair, the "Houmas Fraud," in both of which Slidell's good name suffered, and the proceedings of the Charleston convention, where Douglas routed his enemies.

Finally existed Slidell's labors in the Senate, which could be listed under three main headings, his effectiveness with regard to routine matters and committee work; his exertions to get Federal assistance for Louisiana's economic needs, of which his bill for dredging the Mississippi River's mouths was an outstanding example; and his protests of a strict constructionist against many appropriation bills. He introduced also two measures whose purpose was the acquisition of Cuba by the United States.

One conclusion suggested by this study seems unquestionable, that the views and actions of Slidell and the community he represented in Congress were generally in harmony with each other. Under the pressure of events

Louisiana like Slidell proceeded from political conservatism and noticeable deviations in its existence from the usual Southern pattern to a position typically Southern and radical. Both the state and its Senator were quite ready in 1861 for secession and possible war.

Microfilm \$7.00; Xerox \$24.40. 550 pages.

THE FIRST MOSQUERA ADMINISTRATION IN NEW GRANADA, 1845-1849

(L. C. Card No. Mic 58-5948)

Joseph Leon Helguera, Ph.D. The University of North Carolina, 1958

Supervisor: William Whatley Pierson

This is an administrative study of a quadrennium in New Granadan (Colombian) history, as revealed through manuscript and printed official records, contemporary private correspondence, newspapers, pamphlets, and secondary materials. The Mosquera government, while its material accomplishments were few, was the first consistently to attempt to bring New Granada into the economic and cultural currents prevailing in the Western world of its day.

Partially successful efforts were made to standardize the coinage, and to make uniform the system of weights and measures. Steps were taken to improve communications by road-building, and to encourage the subsidization of private enterprise in railway construction and steamboating. Technical education was fostered with a view toward ending the colonial educational curriculum of law and theology and replacing it with a more scientifically oriented one. Also sponsored by the regime was the impetus to gain an accurate insight of the country's resources by exploration, statistical compilation, and by the publication of scientific research. Commendable in themselves, most of these undertakings were only in part successful because they were superimposed upon a society which remained basically unchanged from colonial attitudes, and because their imposition caused the very administration which sponsored them to fall in disunity.

The economic reforms of the visionary moderns, Pombo and González, at first won congressional support, but were doomed to failure by the conservative nature of the country and by the fact that their champions were unable to recognize New Granada's adherence to custom rather than change. This static attitude was almost impossible to overcome in the precipitous manner employed by the reformers, since their reforms were not accompanied by adequate administrative preparation, and because that attitude dominated the operative echelons of the official fiscal edifice.

At the beginning of the administration, the two most lucrative revenues were customs duties and the tobacco monopoly. The first of these was much diminished by the tariff schedules of 1847 adopted at González's urging. The second, the tobacco monopoly, which promised tangible profits under the combined private enterprise and state-controlled export system of González, was destroyed by the impact of free trade philosophy upon large segments of New Granadan public opinion as voiced by the congress

of 1848, and by the ill-considered action of President Mosquera in sanctioning its abolition in order to win popular approval.

Failure to provide a system of direct taxation or other revenues in the place of the demolished ones gradually caused the end of effective central political and economic control over the provinces and initiated the economic and political disunity and instability which characterized New Granada's history for the remainder of the nineteenth century. In this regard, the Mosquera administration, more than a failure, was a destructive factor in New Granadan history.

The entry of Ancízar into the foreign ministry in 1846 marked the beginning of a strong anti-European and pro-United States policy in New Granadan diplomacy, which culminated in the 1846 Mallarino-Bidlack Treaty, virtually establishing the United States as the dominant influence in the isthmian area. A factor which convinced the Bogotá regime of the wisdom of this new policy was the European-supported Flores Expedition.

As a result of the fall of the Flores government in Ecuador, a state of near war existed between New Granada and that republic, from 1845 to 1849. This added a heavy burden to a financial situation already disrupted by the numerous reform attempts of the Mosquera government. Actual conflict was avoided largely as a result of the able efforts of General O'Leary in Bogotá, Cope in Quito, General Herrán in Pasto, and mutual fears by both Ecuador and New Granada that their exiled leaders, Obando and Flores, would be employed against them by the other country.

The rise of the Monagas regime in Venezuela marked a worsening of relations with New Granada. The threat of war became marked in 1848, and was only dissipated by the ending of President Mosquera's term of office and his having been succeeded in power by General Lopez, a man more politically acceptable to the Monagas administration in Caracas.

The remainder of the nineteenth century in New Granada felt the impact of the Mosquera administration of 1845-1849 which had laid the foundations for the destruction of the semi-colonial society which had brought it to power.

Microfilm \$7.20; Xerox \$25.20. 567 pages.

HISTORY, ANCIENT

ORIENTAL RELIGIOUS RESISTANCE TO HELLENISM

(L. C. Card No. Mic 58-7710)

Samuel Kennedy Eddy, Ph.D. University of Michigan, 1958

The reaction of the Orient to Graeco-Macedonian occupation after Alexander's conquest played a notable part in assisting the decline of Hellenism throughout the region. This study investigates the extent and types of religious resistance against a background of the history of the Hellenistic period. Such a study has not been made before. The Iranian, Mesopotamian, Anatolian, Jewish, and Egyptian societies are considered. Procedure followed was critically to examine relevant sources of literary, monumental, epigraphic, and numismatic evidence.

Resistance manifested itself in four ways. Religious legends exalting heroes of all the native civilizations, except the Anatolian, appeared. This was usually accompanied by rejection of immediate aspects of Hellenism, like refusal to worship Greek gods. Second, prophets foretold the coming of saviors, human or divine, whose apocalyptic prowess would drive out the militarily superior Macedonians. Third, there was actual fighting, to be understood as 'Wars of Religion'. Last, there was proselytism, particularly by the Jews, to a lesser degree by the Persians. This was an effort to win gentiles to native culture.

The regions that were most active were Persis, heartland of the conquered Persian Empire; Judea, with extensions in the Diaspora; and Egypt. Here, all forms of resistance were found in greater or less degree. In Anatolia and Mesopotamia the reaction was less intense. Anatolia was somewhat Hellenized before Alexander; it was too culturally divided to provide a basis for anti-Hellenism. Mesopotamian civilization was dying, and therefore it hardly resisted.

The movements were led by members of the priestly and secular aristocracies. Many Orientals, nevertheless, accepted Hellenism in varying degrees. Nowhere was there total rejection of Hellenism. It was despised only for its military occupation and economic domination; its rationalism was never attacked.

The heroes of the legends and prophecies took the form of priest-kings or god-kings of pre-Hellenistic times. The savior was expected to restore native religion, not only the traditional cultus in those cases where Hellenes interfered, but also the native dynasty, whose existence and functions were rooted in theology.

The saviors of Egypt and Judea were also expected to bring an end to economic hardship. The Hellenic regimes were driven towards attempts to increase revenues, and this goal sometimes created conditions intolerable for both peasantry and artisans. Since ethics were a divine revelation in the East, resentment of exploitation was expressed religiously. The resistance thus had the effect of furthering class war. It sometimes attracted oppressed Greeks and, since intermarriage also occurred, resistance tended to cross cultural and linguistic frontiers in the later Hellenistic period.

Militant resistance in Persis, Judea, and Egypt was important. The Seleukids lost territory in the first two regions. The Lagids were able to suppress the Egyptian rebellions, but had to make concessions to do so, so that the end effect was somewhat similar: Orientalism revived.

Messianic resistance was most important. It increased expectations of a savior all over the East. Persian beliefs became known in Anatolia and Mesopotamia, whence they were transmitted by the Jews of the Dispersion to Palestine. There they became part of the folk-tradition, and were later incorporated into the stories about Jesus. Since all saviors were king-priests or god-kings and examples of morality and justice, and entire region became in part prepared by the resistance to accept Christianity, which appeared within two generations of the close of the Hellenistic era. This study thus raises issues necessary for a complete understanding of conditions existing in the world in which Christianity was accepted.

Microfilm \$6.40; Xerox \$22.60. 501 pages.

HISTORY, MEDIEVAL

THE LIFE AND STATUS OF A GENERATION OF FRENCH WOMEN, 1150-1200

(L. C. Card No. Mic 58-5974)

Arda Susan Walker, Ph.D. The University of North Carolina, 1958

Supervisor: Loren C. Mackinney

This study surveys the status of women in twelfth-century France: their courtship, marriage, education, position in the church, governmental and legal rights, and their position in warfare as warriors or as victims. One chapter is devoted to the anti-feminist pronouncements of the epoque. Another explores the origins and nature of the cult of Mary. The final and summary chapter compares manners and deportment of men and women. Latin and Old French sources were consulted in libraries of North Carolina and France.

Perhaps the most significant interpretation appears in the chapter entitled "Or Queen of Heaven?". Here an effort has been made to determine whether as often stated, the cult of Mary led to the improvement of the lot of women. The conclusion is that geographically and socially, the cult of Mary developed first in an area not characterized by the greatest freedom of women. Likewise, the climax of the Mary cult was reached perhaps a quarter of a century later than the period in which women enjoyed their greatest freedom. While the origins of the cult are obscure, in its early days, it appears to have been a popular rather than an ecclesiastical movement. The twelfth-century Church hierarchy was unwilling to approve such doctrines as the immaculate conception of the Virgin and her bodily assumption. The conclusion reached is that the cult of the Virgin did not usher in freedom for women. Pro-feminist sentiment was not sponsored by the masculine church hierarchy.

Among other findings are these: Women enjoyed a marked freedom in late-twelfth century France. They were well-educated when compared with male contemporaries. They might enter a number of professions. Legally, their rights to inheritance and to government of feudal holdings had vastly improved since the eleventh century.

Forces operating upon society to bring about the rising status of women were: the general democratization of society which carried women along with it; the growth of communal organization; the spread of Roman law; the support offered by the English and French monarchies in their efforts to enhance royal holdings through marriage; the military situation in the Near East; the growth of population and its demands upon commerce; and in some measure—but not so widely as sometimes claimed—the medieval Church. The concluding sentences read: "The tide that raised the position of the bourgeois, the freeman, the serf and the king carried along with it the members of the "weaker sex". The late twelfth century was a spring tide for society in general and a spring tide at its flood for women in particular."

Microfilm \$5.85; Xerox \$20.60. 459 pages.

HISTORY, MODERN

THE IMPACT OF MODERNIZATION ON IRAQI SOCIETY DURING THE OTTOMAN ERA: A STUDY OF INTELLECTUAL DEVELOPMENT IN IRAQ, 1869-1917

(L. C. Card No. Mic 58-3631)

Abdul Wahhab Abbas Al-Qaysi, Ph.D. University of Michigan, 1958

The extent of modernization movements in the Ottoman Empire and their effects upon the intellectual life of Iraqi society are the major purposes of this study. Its significance lies in the fact that it illustrates the beginnings of an intellectual impact of the West upon Iraq between 1869 and 1917, and that it defines the intellectual background of Iraqi society today.

Chapter One sketches the early efforts at modernization in the Ottoman Empire and describes the first extensive reforms undertaken in Iraq by Midhat Pasha, Governor of the Province of Baghdad from 1869 to 1872. Influenced by his knowledge of Western European civilization, Midhat introduced reforms in military organization and administrative procedure as well as in agriculture and transportation. However, while these practical reforms were largely limited to the achievements of Midhat Pasha, his improvements in the educational system and his establishment of a press continued to have a far-reaching effect upon the intellectual life of Iraq.

Chapter Two gives a systematic survey of the development of a modern system of education planned by the Government according to the French pattern. In addition to the new Ottoman Government schools, private educational facilities were operated by French missionary and philanthropic groups who helped to further modern education in Iraq. The Government schools had the primary purpose of providing the reorganized Ottoman army and civil service with local personnel, and in fact, by 1914, the literacy of the urban population had increased from one per cent to some ten per cent, so that the Government and army of Iraq were administered by a majority of Iraqis rather than by Turks.

The first uses of the printing process are discussed in Chapter Three. The Ottoman Government in Baghdad and the Dominican Fathers in Mosul were the pioneers in the introduction of the art of printing in Iraq. The establishment of private presses in the large Iraqi cities followed soon. Two major types of material were produced by these publishers: (1) Medieval religious and literary works, and (2) newspapers and magazines. The continued output of the first group indicated the desire of educated Iraqis to preserve the traditions of the past, but the second gave them the opportunity to express their aspirations for general reforms and Westernized institutions.

Chapter Four presents a discussion of the emergence of a new literary trend in Iraq during this period. The new literature mainly took the form of social poetry, calling for constitutionalism and a representative system of government, improvement of the social status of women, and religious tolerance. The works of the major literary exponents of this development, Jamil al-Zahawi and Maruf al-Rusafi, are studied in some detail.

The last two decades of Ottoman rule in Iraq witnessed the emergence of an intelligentsia whose opinions and aspirations were expressed through political societies, the press and the new literature. By these means of communication, the members of this intellectual elite of Iraq expressed their belief that they were loyal Ottoman subjects belonging to one Ottoman nation. They hailed the revolt of the Young Turks in 1908, regarding it as a reform movement with the aims of abolishing corruption and despotism for the welfare of the entire Ottoman State. Two years later, however, they showed their disillusionment with the policy of Turkification of the more radical leaders of the Young Turks and on the eve of World War I, they advocated administrative decentralization and local reforms in Iraq. Although shortly before 1914 ideas of Arab nationalism were in evidence, the Iraqi intelligentsia was neither strong nor mature enough to call for the political independence of Iraq and other Arab provinces of the Empire.

Two general conclusions can be drawn from this study:
(1) The last phase of the Ottoman period in Iraq was not a period of dark medieval rule, but was a beginning of an enlightened modern era in the intellectual development of Iraq. (2) After the birth of the nation of Iraq in 1921, intellectual life was a continuation and a development of that which had been started in the last phase of the Ottoman Empire between 1869 and 1917. Likewise, with the establishment of the first national Government in Iraq, citizens who were the product of the period when Ottomanism and preservation of the Empire had been the driving forces of the modernization movements, took over the reins of leadership in the new nation.

Microfilm \$3.10; Xerox \$10.60. 238 pages.

AMERICAN FOREIGN AID AND PUBLIC OPINION, 1945-1952

(L. C. Card No. Mic 58-5933)

Robert James Chasteen, Ph.D. The University of North Carolina, 1958

Supervisor: J. Carlyle Sitterson

Participation in two world wars and an appreciation of the interdependence of human society had convinced a majority of Americans that isolationism was dead. The choice facing America after the Second World War was not whether we would participate in world affairs, but on what terms. Americans emerged from the war apparently dedicated to internationalism.

One measure of our participation and the terms on which it would be conducted is the public response to the foreign aid programs inaugurated by the Truman Administration, 1945-1952. Initially designed to push forward postwar programs drawn up during the war, such as reviving free international trade, the exigency of the "cold war" modified drastically America's approach toward international cooperation.

The British loan of 1946 began the formal aid programs and was intimately tied in with wartime proposals to free world trade from the restrictions which had in part brought on the Second World War. By 1947, however, the world picture and with it American attitude had changed. The Truman Doctrine was designed to stop Communism by extending military aid to nations threatened by internal and

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external aggression, while the European Recovery Programs in 1948 was expected to strengthen Europe economically against Communism. The North Atlantic Treaty Organization and the accompanying Mutual Defense Assistance Program of 1949 were intended to rebuild Europe's military defenses and thereby strengthen the West against possible Soviet attack.

The Communist attack against South Korea in 1950 conformed the American belief that aggressive Communism lay at the root of the world's current problems. In large measure, therefore, the Point Four program of technical assistance was seen as extending the fight against Communism to the underdeveloped areas of the world.

Throughout the period 1945-1952, two major factors governing American foreign policy revealed themselves in the development of the foreign aid programs. One was the primary reliance on anti-Sovietism in securing domestic and foreign support for American policy. The other was the retreat from internationalism to a policy of interventionism with emphasis on rearmament. This policy operated behind a facade of international cooperation, ofttimes referred to as the Atlantic or Western Community. However, its continued reliance on anti-Sovietism for support and its emphasis on rearmament for strength, in the face of avowed opposition from many of our allies and most of the uncommitted nations of the world, betrayed its unilateral nature.

Thus, while the groups surveyed in this study and the American public, in general, gave strong support for American participation in international affairs, thereby rejecting isolationism, the majority were not supporting a policy of internationalism. Instead they had given their support to a policy of power politics in which international goals were subordinated in large degree to parochial and ideological goals peculiar to the United States. Only a minority of Americans appeared willing to subordinate "vital" national interests for the sake of genuine internationalism. In the largest sense this meant compromising national sovereignty for the sake of the common good. In mid-twentieth century such a policy appeared impossible.

Microfilm \$5.45; Xerox \$19.20. 425 pages.

THE NEW DEAL AND THE PROBLEM OF MONOPOLY, 1934-1938: A STUDY IN ECONOMIC SCHIZOPHRENIA

(L. C. Card No. Mic 59-713)

Ellis Wayne Hawley, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor Howard K. Beale

One of the central problems of twentieth-century America has revolved about the question of reconciling a modern industrial order with the competitive ideals and liberal individualistic traditions inherited from the nine-teenth century. During the period covered by this study, the five-year span from 1934 through 1938, this conflict between American ideals and practical necessities seemed particularly acute. On the one hand, the depression produced a demand for planning, rationalization, and the erection of monopolistic institutions that could weather defla-

tionary forces. On the other, it intensified antimonopoly sentiment, caused a loss of confidence in business leadership, and produced a demand that competitive ideals be made good. The dilemma of the New Deal lay in the political necessity of making concessions to both of these demands.

The present study deals with the efforts of the Roosevelt Administration to resolve this dilemma. First of all, an attempt is made to trace the pattern of conflict and compromise between various schools of economic thought, between those that desired to restore and preserve a competitive society, those that envisioned a type of governmentsponsored business commonwealth, and those that believed in a form of democratic collectivism in which the monopoly power of businessmen would be transferred to the state or shared with other economic groups. Part I deals with this conflict of policy under the National Recovery Administration. Parts II, III, and IV trace the activities of each group during the period from 1935 to 1938, and Part V deals with the conflict that arose when the Administration attempted to devise a program to combat the recession of 1937. Secondly, an attempt is made to relate these various schools of thought to the interplay of pressure groups and popular symbols that actually produced policy decisions. The primary emphasis is on policy-making, on the men, beliefs, pressures, and symbols that resulted in policy decisions, not on the validity or economic merit of the policies involved. The study is also limited to the field of business and does not attempt to deal in any detail with agricultural, labor, financial, or transportation policies.

The main stream of policy that emerged from this conflict ran toward a type of partial planning. Monopolistic arrangements were generally sanctioned for those economic pressure groups that could slip their programs inside the competitive ideal or justify them on the basis of other ideals, while the restrictive tendencies in such an approach were counteracted by a policy of deficit financing and governmental subsidization. Certainly this was not a logically consistent solution, and businessmen, economic planners, and antitrusters all tended to be dissatisfied with it. It was, however, a politically feasible one, and one that shaped the future course of the American economy.

It is probably a mistake to say that there was a basic reversal in New Deal policy following the recession of 1937. Policies that attacked monopoly and those that fostered it existed side by side throughout the entire period, and the chief solution for the recession was an extended program of partial planning and the resumption of federal spending. Nevertheless, for a variety of reasons, there was a decided shift in emphasis, and a number of concessions were made to the antitrust point of view. The resulting program, however, was limited by the practical necessity of preserving those monopolistic arrangements that actually checked deflation or were a part of integrated industrial operations. While policy might vacillate between the two extremes, one set of policies could not and never did displace the other. The practical outcome was an economy characterized by private monopolistic arrangements, partial planning, governmental subsidization, and occasional gestures toward the competitive ideal, an economy that in its main lines still exists.

Microfilm \$27.80; Xerox \$47.00. 1107 pages.

THE PIONEER EDITOR IN MISSOURI

(L. C. Card No. Mic 58-7447)

William Henry Lyon, Jr., Ph.D. University of Missouri, 1958

Supervisor: Lewis E. Atherton

The pioneer editor arrived in the frontier community soon after members of the other professional classes, where he played a creative role in the formation of governments and the building of civilized societies. In his prospectus, which he addressed to prospective subscribers, the editor disclosed the frame of reference in which he would publish his newspaper. He conceived of his newspaper as a moral agent, a sentinel of the public liberties, a preceptor to the inquiring mind, a "social friend" to those seeking amusement and entertainment, and an advertiser of the resources of the community and state. The editor believed that every freeman should read a newspaper to keep abreast of political events.

Four agents in pioneer society fostered the newspaper press: the government, which needed to publicize its laws; politicians, who wished to crystallize public opinion; the literate citizenry, who sought information and intelligence; and the printer-editor, who was motivated by an amalgam of altruism and political and economic advantages. Politicians contrived to underwrite newspaper establishments by the allocation of the public printing, or through the combined efforts of partisans who raised money.

Most newspapers had a political purpose. Politicians recognized their indispensability to the success of the party. Newspapers emerged in the 1830s as a possible replacement of the caucus, but lack of unity among editors and a reputation for party irregularity acted against the press system in favor of the convention system of nomination. Before 1832 the press of Missouri did not represent the political alignments in the state, but after the flowering of the Jacksonian movement a closer correlation existed between press and politics. As the guardian of liberties and a medium of public expression, the editor carried liberty of expression to the point of abuse and scurrility, which sometimes culminated in street fights and court suits. In the 1820s the courts temporarily challenged the freedom of the press by opposing editorial criticism of judicial decisions.

Lacking his own private capital to establish a newspaper, the pioneer printer either secured a loan on which he paid interest or obtained a business partner who shared the profits. As a business enterprise a printing office often paid small returns on the investment. Subscribers and advertisers reluctantly paid their bills, if at all, and the editor's lax business methods reduced his income, principally by overextension of the credit system. Keen competition brought a rate war among editors which led to the reduction of subscription rates below the profitable level.

As a profession, the editorial corps was not bound together by any tight rules of discipline or an accepted code of etiquette. The first real steps in this direction came only with the meeting of the first Missouri editor's convention in 1859. The early editors styled themselves "printers" but with the development of the politically oriented sheet, the function of editor began to evolve. Those editors who devoted their talents to politics often had not learned the trade of printer. Many of them were lawyers. As pub-

lishers in a highly mobile society, the pioneer editors shared a trait in common with the other elements of society—that of itinerancy.

The end of frontier journalism came slowly and unevenly. Although the pioneer editor printed a paper after the Civil War in many sections of the state, the transformation to the modern era had begun as early as 1836 with the establishment of the first daily in Missouri.

Microfilm \$3.55; Xerox \$12.20. 276 pages.

COLUMBUS AND THE RAILROADS OF CENTRAL OHIO BEFORE THE CIVIL WAR

(L. C. Card No. Mic 58-7185)

Walter Rumsey Marvin, Ph.D. The Ohio State University, 1953

The most far-reaching changes Ohio had yet witnessed in transportation occurred in the period 1830 to 1860. The canal system, the National Road, the great stage coach lines, and the turnpike and plank road companies reached their peaks and began their decline in those years as the railroads came into their own. The present study deals with the origins of the first rail lines to enter Ohio's capital, the nature of the companies which built them, their problems and policies, the part Columbus played in their coming, and the effects they had upon the city.

From the days when several Indian trails met at the confluence of the Scioto and Olentangy rivers, where Ohio's capital city now stands, down through the years of the Ohio and Erie Canal, the National Road, the turnpikes and plank roads, and the railroads, and on through the construction of its airport, Columbus has been a comparatively easy place to reach, thanks to the absence of topographical obstacles. To every pioneer community, transportation facilities for connecting with markets, sources of manufactured goods, and the well-springs of new settlers are essential. Columbus needed to reach Lake Erie and the Ohio River, the great arteries for the state. The nearness to Sandusky harbor on the lake had been stressed as early as 1812 at the first sale of lots in the new town. By 1834 a turnpike led to the lake, the canal led to both lake and river, and the National Road extended from the river on the east towards the frontier on the west. Before the first railroads operated in Ohio, Columbus already had excellent transportation facilities.

Jackson was in the White House and internal improvements were being agitated for when Ohio in 1830 chartered its first railroad. All told, through 1837 until the panic of that year blighted the great boom, sixty-nine railroads were launched in the state, of which only five were built. Certain important elements in early rail charters may be analyzed as follows:

- 1) Route This was described as broadly as possible, at first with at least one terminus on a navigable waterway.
- 2) Means of transportation This was also very broadly stated, as for instance, "by canal, slack water navigation, railroad, track road, McAdamized road or turnpike," and "by...steam or animals, or any mechanical or other power or by any combination of them."
 - 3) Organizers Charters generally designated either

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"commissioners" or "corporators" to see to the launching of a new concern. To distinguish between them is hard, and similarly, to tell when such men were figureheads or nominees and when they were the prime movers, clearly a matter of importance, is very difficult.

4) Selling stock - Directors could be elected and the corporation organized only after a stipulated amount of stock had been subscribed for and payments made on it. Stock was sold on the installment plan, with low down payments. Subject to referendum approval by the voters, governmental bodies could subscribe.

In January, 1832, the Mad River and Lake Erie Rail-road obtained a charter, the third granted in the state's history and the first to result in actual construction. The next month a line was incorporated to run between Columbus and Sandusky, but it came to naught as did so many other roads with the same objective (one was finally built in 1891). No other rail charter before 1836 mattered greatly to Columbus.

The total of thirty-two railroads incorporated by the 1835-1836 legislature was equalled in no other session and marked the peak of the boom. Of them all, only the celebrated Little Miami Railroad was completed without interruption of its career. Six of the proposed lines ran to Columbus although only one company seems to have originated there. None of them ever became a going concern save for the Cleveland, Columbus and Cincinnati Railroad (C.C.& C.) whose charter lapsed and had to be revived nine years later. The great outpouring of charters in this and subsequent years at times produced groups of railroads, between substantially the same two points or areas, so inextricably intertwined that one cannot tell whether they were competitive, complementary or merely overlapping. Such was the case with roads between Columbus and Sandusky and similarly between Columbus and Springfield.

The decade from the 1837 panic to the 1847 "Railroad Elections" in Columbus saw little growth in Ohio's rail network except for the construction of the Little Miami road and the building of most of the Mad River and Lake Erie line. (Four earlier roads, tiny and unimportant, are passed over.) Work on the Mad River and Lake Erie commenced at Sandusky in 1835; by 1848 it reached Springfield and met the Little Miami; three years later it attained Dayton, the goal prescribed in its charter. The Little Miami built its road from Cincinnati via Xenia to Springfield in the years 1838-1845. The two lines created the first cross-state rail route, linking Ohio's largest city and river port with Lake Erie.

Just before the panic began the legislature passed two pork barrel acts, the "Plunder Law" and the law distributing surplus federal funds. The former stimulated railroad building although it resulted in a loss to the taxpayers. The latter did little for the rails. Thereafter, until 1845 railroad incorporations almost ceased. Of most interest was the Columbus and Xenia (1844) in which certain associates of William Neil of Columbus, "the stage coach king," were leaders. The complicated activities of Neil and his family as to transportation between Columbus and Sandusky suggests their ambition to monopolize all connections (rail, turnpike, stage coach, and plank road) between those places.

The 1844-1845 legislative session ended with charters outstanding for four railroads between Columbus and Lake Erie in all of which the Neils, their relatives or associates had a hand. Backers of three of the lines -- the fourth inexplicably dropped out of sight -- agreed to unite their ef-

forts and support the C.C.& C. The next year, as business confidence revived, the lawmakers approved eleven more projected lines throughout the state, of which the two running to Columbus never materialized.

From 1847 through 1851, when the new state constitution made charters for business corporations obtainable by administrative procedure rather than by act of legislature, ten railroads touching Columbus were organized, out of seventy-two for the entire state. Three of the ten were eventually built. Under the new procedure, until the Civil War broke out, seventy-two more railroads were incorporated, six of them to reach the capital. None of the six came to life. This concludes the story of incorporating rail lines to Columbus. It is now necessary to return to 1847 when the first two lines to reach there began taking shape.

That year the voters of Columbus and Franklin County, in separate elections, overwhelmingly approved stock subscriptions of \$50,000 by each governmental body to each of two railroads, the Columbus and Xenia and the C.C.& C. Both companies at once prepared to start construction under the direction of Alfred Kelley, recently elected president of the two lines, although no corporate link was visible between the companies. The Neils were also interested in both. Kelley was Ohio's great banking, business, and political leader who had brought its extensive canal system to successful completion.

The early days of the Columbus and Xenia Railroad, first to enter Columbus, illuminate problems confronting the builders of pioneer lines. Efforts to sell stock continued for three years before enough capital was raised, including several municipal subscriptions, to justify Kelley's going ahead in 1847. A premature attempt to control the company by "rigging" the stock purchases had apparently been made two years earlier. A survey, then a resurvey; advertising for bids followed by abandonment of all work — these revealed inexperienced management before Kelley took charge. The legislature co-operated by passing sweeping amendments to the charter.

How the road was built is described in considerable detail. Cholera was the principal difficulty, reaching epidemic proportions in 1849. The first train ran February 22, 1850. Regular service to Cincinnati, in connection with the Little Miami Railroad, began five days later. The line (fifty-four miles long) cost slightly over one million dollars to build, of which nearly one-third was raised in the East on bonds, about seventeen per cent from municipal funds, perhaps a fifth in the form of entrepreneurial capital from Columbus, and the balance derived from other loans, aid from the Little Miami Line, and miscellaneous sources.

The company quickly earned handsome profits and began paying ten per cent dividends a year. Soon it was investing in connecting roads to increase its traffic, wherein it probably succeeded, although the stock it bought fast proved valueless.

The opening of the C.C.& C. from Columbus to Cleveland in 1851 emphasized the Columbus and Xenia's function as a mere link in the rail connection between the state's two principal cities. At least three attempts unaccountably failed to consolidate the companies forming this connection. In 1852 a preliminary agreement and in 1853 a lasting one joined the Columbus and Xenia and the Little Miami by a "Contract of Union" which in effect marked the end of independent operations on the shorter

line, although not of its corporate existence. In 1869 the two concerns were acquired by the Pennsylvania Railroad which in 1943 extinguished the smaller company.

The C.C.& C. is the most important of the four roads entering Columbus before the war. A Cleveland project, it grew into a great and profitable line, was the nucleus of a large midwestern network, and finally, as part of the Big Four, became a leading segment of the New York Central System. Its early days were marked by backing and filling like that seen in the Columbus and Xenia, including an admittedly unlawful scheme to inflate stock subscriptions. New England capital and experience in railroad building linked with Alfred Kelley's determination finally saved the day. Construction began in earnest in 1847 and February 21, 1851, the road was opened.

Profits at once began rolling in. The first twenty-six months of routine operations yielded the stockholders twenty-eight per cent in dividends. Thereafter, the management stated, the regular yearly rate would be ten per cent since "the day for extravagant dividends has passed." Shares on the New York Stock Exchange reached 133 (par was 100).

Expansive ideas soon developed. The road obtained legislative approval for several branches, which were never built; it guaranteed bonds of connecting lines; it agreed to joint operation with the Lake Shore road (from Cleveland to Erie, Pennsylvania) of which Kelley in 1852 became president. Henry B. Payne, celebrated Ohio political and business figure, succeeded Kelley as operating head of the C.C.& C.

Ohio's rail network had grown to include two rival Cincinnati-to-Lake-Erie routes which promptly arranged with steamer lines and railroads in New York State to form competitive through routes. In 1853 the Ohio groups concluded what was probably the state's first pooling agreement, which lasted barely a year and dissolved in acrimony. The C.C.& C., as in great part an access or "bridge" road providing many points in Ohio and further west with a connection to the great eastern trunk lines, thereafter participated in most rate and traffic agreements.

By 1855 its stock holdings in other enterprises reached nearly a quarter million dollars; it also had a contingent liability on \$800,000 bonds guaranteed for connecting lines. Half this sum represented Columbus, Piqua and Indiana Railroad bonds guaranteed with two other lines in a remarkable contract that gave it the best route to Indianapolis, St. Louis, and the Southwest. The guarantee proved costly, although warranted, perhaps, by the increased traffic. Vanderbilt interests eventually acquired the C.C.& C.

From the day the B. & O. Railroad was formed in 1827, numerous groups in Ohio sought to build a line to meet it. First to succeed was the Central Ohio Railroad, a Zanesville enterprise chartered in 1847. Among the Columbus sponsors were Robert Neil (brother of William, "the stage coach king,") and several Neil associates. Although the company was organized without incidents or false starts, private capital was slow in coming forward. The legislature passed helpful charter amendments and several communities voted handsome public subscriptions, but Columbus and Franklin County voters decisively rejected municipal stock purchases of \$20,000 and \$50,000 respectively in 1850, and in 1851 did so again even more emphatically. By the end of 1850, nevertheless, construction had started; November 1, 1854, the first train ran from Bellaire to Columbus, the two termini.

For many reasons (no single cause was predominantly responsible) the work cost nearly twice the estimates. The debt burden grew ever worse, a tunnel caved in, rolling stock was of the wrong kind, low water in the river produced more traffic than the infant railroad could handle, and the management came under fire for failing to "buy at home." The panic of 1857 had just struck when Hugh Judge Jewett became president. A year and a half later he was appointed receiver. From that position he rose to become the highest paid American railroader, president in 1874 of the Erie Railway.

The Central Ohio's main trouble was a faulty connection at its eastern end with the B. & O. Wheeling, the logical meeting place, raised so many difficulties that the line was built to a ferry crossing at Bellaire, four miles to the south. Not until 1871 was the river bridged, five years after the B. & O. had obtained control of the road in which by then it had invested heavily. The year 1914 saw the Central Ohio merged into its overlord.

The fourth and last railroad to build its tracks into Columbus before the war was the Columbus, Piqua and Indiana (often called the C.P. & I.) which early fell victim to the differences in track gauges then existing in Ohio. Conceived in Piqua and chartered in 1849, it had Columbus sponsors including associates of the Neils, but neither the city nor Franklin County ever favored it enough to vote on a municipal stock subscription. The legislature, however, passed many acts to help it.

The C.P. & I.'s route was from Columbus to a connection at the Indiana border with some likely Hoosier line. Indiana railroads ran on a gauge of four feet, eight and one-half inches. With certain exceptions Ohio lines set their tracks four feet ten inches apart. The C.P. & I., having to choose, picked the Indiana width, a selection that proved more unfortunate than unwise.

It contracted in 1852 with the Indianapolis and Bellefontaine Railroad for a through route from Columbus to Indianapolis, the receipts to be divided proportionately. The C.P. & I. progressed so slowly towards the border, however, that its partner sought another Ohio outlet. To undo the contract, the partner shared in the endorsement of \$400,000 C.P. & L bonds described earlier in connection with the C.C.& C. The C.P. & I.'s "gauge-mate" to the east, the Steubenville and Indiana Railroad, was as feeble a road as the C.P. & I. itself. Thus it lacked effective traffic outlets at both ends. It was too poor, moveover, even to pay for twenty-four miles of rail to complete its track to the Indiana line. In 1856 it went into receivership. It emerged therefrom during the war and by a series of consolidations under various names quickly grew to real importance. In a highly dramatic, eleventh-hour coup the Pennsylvania Railroad snatched the property from under Jay Gould's nose and still holds it.

A consideration of the effect the early railroads had on Columbus concludes the study. In material affairs the impact was slight. Population gain in the decade 1850-1860 was 3.8 per cent against 18.1 per cent in the state and much larger gains in Cleveland and Cincinnati. (Zanesville and Steubenville, however, lost population.) "Western fever," that is, the lure of rich farm lands in the west, was the contemporary explanation for the small increase.

Local business received no important additions although the city's potentialities as a centrally located distribution point must have improved. Not until the railroad to the Hocking Valley coal fields was built after the war did HISTORY 2077

Columbus benefit appreciably from the new carriers. Intangible benefits, such as increased accessibility to cultural influences, are briefly considered. Since the city was not very railroad-minded to begin with and profited little at first from the rails, which it supported sparingly, one may perhaps conclude that in early Ohio railroading as in other matters, one got out of it what one put in.

The designation "businessman" seems to fit best the persons mainly responsible for the beginnings of the state's rail system, but rugged individualism must not be over-rated. That spirit always functioned hand in hand with aid from public funds and eastern bankers. Public assistance for certain enterprises was no new thing in Ohio. In the case of the railroads it was a pragmatic, American way to get results.

More typical, more American perhaps, was the underlying belief of the railroad builders: "Tall oaks from little acorns grow." There was a "manifest destiny" for each new line as for the country itself. To support a railroad in that springtime season was to support a cause, a movement, with spiritual values and prospective material rewards in most satisfying balance.

BIBLIOGRAPHICAL NOTE - The foregoing study is based primarily on (1) minute books of eleven Ohio railroads in the offices of the successor companies; (2) annual reports of twenty-three railroads (mostly in pamphlet form); (3) files of twelve Ohio newspapers; (4) files of the invaluable Railroad Record in the Ohio State Archaeological and Historical Society at Columbus, and similar periodicals; (5) General Laws and Local Laws of Ohio, 1830-1852; (6) the Ohio Secretary of State's Record of Corporations.

Microfilm \$4.80; Xerox \$16.00. 374 pages.

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BRITISH INTERESTS AND ATTITUDES REGARDING THE REPUBLIC OF TEXAS AND ITS ANNEXATION BY THE UNITED STATES

(L. C. Card No. Mic 58-7422)

Mary Lee Spence, Ph.D. University of Minnesota, 1957

This study is focused on the interests and attitudes of British individuals and organizations regarding the Republic of Texas, 1836-1845. An attempt has been made to ascertain the attitude of the Government and to evaluate the influence of various interest groups on British foreign policy. The locale includes both England and the Lone Star Republic.

Among the adversaries of Texas were the British humanitarians who saw the Texan war for independence as a blow to the cause of freedom and humanity. The British and Foreign Anti-Slavery Society under the leadership of Joseph Sturge and John Scoble spearheaded the movement to prevent the Government from recognizing the independence of the Republic and to discourage actively emigration to Texas and the investment of capital there. It gave its support to an abortive project of Samuel Pearl Andrews, a Houston lawyer, and Lewis Tappan, a New York merchant,

both of whom were convinced that Texas, because of its impoverished condition and need for immigrants, would be willing to sacrifice slavery if by so doing she could secure either a British loan or economic concessions such as discriminating duties in favor of Texas products. And though Tappan and the Committee of the British and Foreign Anti-Slavery Society had at least two interviews with Lord Aberdeen, the Foreign Minister, in the summer of 1843, they failed to win the Government's support for their plan.

In addition to British philanthropists, the foes of Texas included English holders of Mexican bonds and those interested in colonizing Canada, Australia, and New Zealand with whose schemes emigration to Texas would conflict. In arrangements with her creditors in 1837, Mexico named Texas as one of the departments in which land was pledged as security for her bonds. The inclusion of Texas in this fashion served to focus the attention of English creditors upon Texan affairs and in turn raised hopes in Texas of the procurement of British support for her peace negotiations with Mexico if she offered to assume a part of the Mexican debt.

But if Texas had enemies abroad, she also had friends. Among them were the free traders, who saw in the cotton economy of Texas a low tariff market. Among them also were the promoters who hoped to benefit personally either from the sale of land or land scrip or by the acquisition of large tracts from the Republic which were usually conditioned upon the introduction of a specified number of emigrants. Chapters devoted to commerce and emigration examine not only the laudatory promotional opinions and predictions, many of which were too frequently confirmed by British officials in Texas, but also the business activities and colonizing projects—such as the Kennedy-Pringle dream—in which Britishers had interests.

It was from the publications and conflicting testimony of these various interest groups and promoters that the British reading public formed its impressions of Texas and the Texans. At one extreme was the favorable and scholarly work of William Kennedy, whose ardent services on behalf of Texas in England won him and his associates a conditional grant of land estimated at some four and one-half million acres. At the other extreme were the derogatory remarks of critics like N. Doran Maillard and Charles Hooton.

The various interest groups of which these writers could be considered spokesmen not only helped shape public opinion but also brought strong pressure to bear upon the Government's foreign policy toward Mexico and Texas. That the Foreign Office sometimes failed to respond was no fault of theirs.

Microfilm \$3.30; Xerox \$11.20. 253 pages.

THE IMPERIAL CONFERENCE OF 1911

(L. C. Card No. Mic 59-730)

Floyd Elden Watts, Ph.D. The University of Wisconsin, 1959

Supervisor: Associate Professor Philip Curtin

The Imperial Conference was a fundamental institution of the British Empire for exactly fifty years, 1887-1937.

The framework of the British Commonwealth of Nations was hammered out within the Imperial Conference. The Imperial Conference of 1911 was the key Conference in the series of fifteen. It is usually said that the British Commonwealth arose from the changes in intra-Imperial relations caused by Dominion participation in the First World War. This is erroneous; the War simply accelerated a process clearly apparent in 1911. Close analysis of the 1911 Conference reveals an interplay of conditions and pressures in the Imperial fabric which made the Commonwealth inevitable. The War hurried an evolution which would otherwise have been more leisurely. This thesis is, therefore, an investigation into Commonwealth origins.

My approach to the problem is that of a close analysis resolution by resolution of the 1911 Conference in session. Each resolution has been placed (with varying amounts of detail) in its proper background. Since the Imperial Conference of 1911 did not meet in a vacuum, I have stressed the social, political, and economic conditions of Great Britain, Canada, South Africa, Australia, and New Zealand as the principal determinants in Conference deliberations. Influences of the international scene have also been given prominence. The personalities of the prime ministers and their colleagues are given more play than is usual in a study of this kind, for very often personalities influenced the Conference more than the issues themselves. I have assumed throughout that the Conference was a useful and effective institution, but I have not explicitly evaluated its worth. Rather, I have tried to show why it did what it did and to explain the motivations behind the sometimes seemingly inexplicable behavior of the prime ministers.

The 1911 Conference is peculiarly adaptable to this approach. It was a meeting in full panoply of the "big six" of the British Empire. The Dominions were feeling in 1911 their full strength for the first time. Conference discussions were uninhibited and every imaginable topic debated

in detail. The Proceedings were published verbatim; after 1911, verbatim reports of an Imperial Conference were never again published. The 1911 Conference is, therefore, tailor-made for a case study of the whole range of problems confronting Britain and the Dominions, both individually and as a family of nations, at a crucial period in British Imperial history.

Primary sources for this study are principally two: the Conference Proceedings and the parliamentary debates of the Dominions. The Dominions' debates have rarely been used, and never thoroughly, by writers on the Imperial Conference. Without a thorough immersion in the Dominions' debates—the ethos of a parliamentary democracy can be found in its public debates—no valid appraisal of the Im-

perial relationship is possible.

Close analysis of the 1911 Conference reveals with a wealth of cumulative detail that two forces only held the Dominions together: Britain, and the heritage in institutions (much modified) which they had all received from the mother country. Institutions alone were not enough for unity; the indispensable member of the group was Britain -- the Imperial center. Agreement among the five Dominions was rare. Time after time Britain was cast in the role of buffer and referee, a role Asquith and the Liberals were peculiarly qualified to play. For the first time, a British prime minister went on record as acknowledging the inherent equality of all the members of the Imperial Conference. The Liberals began, therefore, the process of shepherding a group of embryo nations to the status of "international persons." The Imperial Conference of 1911 is thus the best possible illustration of that period of groping for a workable relationship between a mother country and her erstwhile colonies. The Dominions were thereby enabled to commemorate, not Independence Day, but Dominion Day. Microfilm \$3.80; Xerox \$12.80. 293 pages.

HOME ECONOMICS

MONEY MANAGEMENT EXPERIENCES OF A SELECTED GROUP OF LOUISIANA YOUTH AS RELATED TO SUBCULTURE, SEX, SOCIAL STATUS AND AGE

(L. C. Card No. Mic 58-5986)

Florence S. Abington, Ph.D. The Florida State University, 1958

The general aim of this study was to attempt to identify the types of money management experiences provided for adolescents and their beliefs concerning money and its use, from two different subcultures in Louisiana and to relate these experiences and beliefs to the subjects' sex, social status, and age.

A review of the literature revealed no studies of the relationship between adolescents' money management experiences and social class membership.

Four null hypotheses were tested:

- Money management experiences of subjects are independent of sex, social class, and age when subculture is held constant.
- 2. Money management experiences are independent of subculture.
- 3. Expressed attitudes and beliefs concerning money management are independent of sex, social class, and age when subculture is held constant.
- 4. Expressed attitudes and beliefs concerning money management are independent of subculture.

The subjects were 618 adolescents fourteen to eighteen years old, the majority of whom were senior 4-H Club members; 435 were of French-Acadian descent, and 183 were of Anglican descent. There were 285 males and 333 females; 368 were classified as lower and 250 as middle class according to the McGuire-White Index of Social

Status (Short Form); there were 355 fourteen and fifteen year olds and 263 sixteen to eighteen year olds.

Data were collected by means of a questionnaire or group interview schedule administered by the investigator or the home demonstration agent of the parish in which the respondents lived.

The Chi-square test for independent samples was used to determine whether or not responses of subjects were independent of (1) subculture, (2) sex, (3) social status, and (4) age. A probability of 5 per cent was accepted as the criterion of significance.

Experiences in learning to use money were found to be related to the subcultural group to which respondents belonged but subculture was independent of the respondents beliefs and attitudes concerning money. The sex of the subjects proved to be related to a significant degree both to subjects' money management experiences and to their beliefs and attitudes in both subcultures. Social class was significantly related to experiences connected with clothing expenditures. Expressed beliefs concerning money were independent of age in both subcultures. In general, age was related to more money management experiences of the Anglican than of the French subjects.

It was, therefore, possible to reject the null hypotheses that in general (1) money management experiences of subjects are independent of sex and age when subculture is held constant; (2) money management experiences of subjects are independent of subculture, (3) expressed attitudes and beliefs concerning money management are independent of sex. The null hypotheses that subjects' money management experiences are independent of social status (except in isolated instances), and that subjects' beliefs and attitudes concerning money and its use are independent of subculture, social status, and age were held as tenable.

Microfilm \$2.00; Xerox \$5.40. 107 pages.

HEAT INDUCED OXIDATIVE REACTIONS IN MUSCLE TISSUE

(L. C. Card No. Mic 58-5998)

Margaret J. Tims, Ph.D. The Florida State University, 1958

The purpose of this study was to investigate the nature of undesirable odor and flavor changes which occur in stored cooked muscle tissue. An intensive oxidative reaction involving highly unsaturated fatty acids was found to occur in muscle tissues subjected to thermal treatment. This was demonstrated by a large increase in the amount of colored compound formed by reacting the tissue with 2thiobarbituric acid (TBA). TBA values of cooked meats increased approximately five fold within a few hours after cooking whereas uncooked samples showed no appreciable change throughout a two-week storage period. Undesirable odors and flavors accompanied an increase in TBA values and are believed to be caused by oxidation of tissue lipids. Diphosphate, triphosphate and Graham's sodium polyphosphate, but not monophosphate, were effective antioxidants in inhibiting the reaction.

The lipid fraction involved in flavor changes was investigated by comparing two rancidity tests: (1) the 2-thiobarbituric acid test which can be performed directly on the muscle tissue and (2) the peroxide determination in which extraction of the fat is a necessary preliminary step. The available evidence indicated that rancidity is initiated in a lipid fraction, possibly a protein bound phospholipid, which is not readily extractable with the usual fat solvents.

Tissue rancidity occurred more rapidly in uncured than in cured cooked meats. This is believed to be related to the state of the heme pigment. It was postulated that ferric denatured globin hemochromogen, formed in fresh meat under the influence of heat, acts as an active catalyst for the oxidation of unsaturated fat whereas ferrous nitric oxide hemochromogen, the pink pigment of cured meat, does not. This hypothesis was substantiated by the difference in TBA values of cured versus uncured cooked meats. Microfilm \$2.00; Xerox \$3.00. 54 pages.

LANGUAGE AND LITERATURE

LANGUAGE AND LITERATURE, GENERAL

FIELDING'S JOSEPH ANDREWS: STUDIES TOWARD A CRITICAL AND TEXTUAL EDITION

(L. C. Card No. Mic 58-7817)

Martin C. Battestin, Ph.D. Princeton University, 1958

This dissertation attempts to furnish the materials for a critical and textual edition of Fielding's Joseph Andrews. The studies are divided into three major sections: I, "Composition, Publication, and Reception"; II, "Theme and Structure: Perspectives"; and III, "Text". A brief appendix on Fielding's politics as revealed in the novel concludes the thesis.

Part I begins with a biographical discussion of the circumstances under which Fielding began composition; here investigation sheds new light on Fielding's obscure politics during 1741-1742. Next, a case is made against the old assumption that Joseph Andrews was undertaken primarily as another parody of Pamela. A date of composition is proposed on the basis of both internal and external evidence. Part I ends with an account of the publication and reception of the novel.

Part II, the heart of the thesis, analyzes the themes and structure of Joseph Andrews. Here a close reading of the text itself is supplemented by the methods of historical criticism, placing the novel in the related contexts of seventeenth- and eighteenth-century Latitudinarian Christianity and of Fielding's own morality, which, in its emphasis upon good-nature and charity, ultimately derives from his favorite Low Church divines, Barrow, Tillotson, Clarke, and Hoadly. The influence of the homilies-especially Barrow's Of Being Imitators of Christ--and of biblical epic theory on the conception of Joseph Andrews is also examined. In this regard, the sermons present four points of special significance: (1) the depiction of the good man as hero; (2) the notion that the sum of his goodness is chastity with respect to himself and charity with respect to society; (3) the choice of Joseph and his rejection of Potipharis wife to represent the former and the pilgrim-patriarch Abraham, the epitome of faith expressed in works, to represent the latter; and (4) the analogy of the good man's life to a pilgrimage through strange lands to his true home. The focus of Part II is, of course, the interpretation of the themes and structure of Joseph Andrews as a whole, the examination of the novel as a meaningful, coherent artifact. As part of this objective, an attempt is made to explain and justify the Wilson episode. Part II closes with a discussion of an important secondary theme, Fielding's fictional continuation of the "Apology for the Clergy" begun in The Champion.

The final third of the thesis will be of interest primarily to the textual scholar. It provides a bibliographical description of the five authorized editions of Joseph Andrews published during Fielding's lifetime and a complete record of the numerous textual variants. Of more general interest

and use, the commentary on Fielding's "Alterations and Additions" explores the significance of the revisions to an understanding of his craftsmanship and satiric intent.

Microfilm \$6.05; Xerox \$21.00. 474 pages.

A COMPARISON OF ORAL AND WRITTEN LANGUAGE: A QUANTITATIVE ANALYSIS OF THE STRUCTURE AND VOCABULARY OF THE ORAL AND WRITTEN LANGUAGE OF A GROUP OF COLLEGE STUDENTS

(L. C. Card No. Mic 58-7618)

James Reid Green, Ph.D. New York University, 1958

The Nature of the Problem

This investigation presents a comparison of the vocabulary and structure of the unrehearsed speaking and writing of a group of 29 teachers college students. The language productions which constituted the data of the study were obtained as responses to the same narrative stimuli for the whole group without the subjects' knowledge that their language structures and vocabulary were being examined. Under conditions designed to make a comparison of the differences between speaking and writing, each subject produced two paired sets of responses, totaling 13,684 words in speaking and 18,447 words in writing.

Method of Analysis

From the language data tabulations were made of the number of times each different word was used, the letter-lengths of each word, frequencies of parts of speech, frequencies of main and subordinate clauses, and frequencies of various kinds of subordinate clauses. Verbid equivalents of finite clauses were counted in a further study of ratio of subordination.

Results

A comparison of the vocabulary tabulations showed the following differences between speaking and writing:

1. There were 930 different words used one or more times in both speaking and writing, in speaking alone 336 different words, and in writing alone 1264 different words.

2. The first 100 words in order of frequency accounted for 69 per cent of the speaking and 58 per cent of the writing vocabulary. Seventy-three words in both speaking and writing of these first 100 words were the same.

3. Speaking used proportionately fewer words relating to size and fewer words naming parts of the body. The letter lengths of words in speaking were shorter but the words used in speaking only were slightly more "difficult" than the words used in writing only, as determined by the Thorndike-Lorge rating per million words in general

printed materials. The speaking vocabulary was characterized by proportionately more contractions and a greater use of pronouns, as well as proportionate frequencies similar to those of Vulgar written English as defined by Fries in American English Grammar.

A comparison of language structures showed the following:

- 1. Proportionately more clauses of all kinds were used in speaking, but they were shorter than those of writing.
- 2. Noun clauses were used proportionately more and adverb clauses of all kinds were used proportionately less in speaking.
- 3. Verbids of all kinds were used less in speaking as structural equivalents to finite predictions. No uses of past participles were found in speaking against 73 such uses in writing.
- 4. There appeared a slight tendency for individuals to carry over to writing the ratio of subordination used in speaking, but individual behavior in this matter was widely variable.
- 5. A comparison of the frequencies of parts of speech showed that nouns, verbs, conjunctions, and adverbs were found proportionately more often in speaking than in writing; adjectives and prepositions were found proportionately in writing.
- 6. There was a slight tendency for individuals to carry over to writing a high percentage of verbs and adverbs used in speaking. Otherwise the distribution of parts of speech appeared to be largely a matter of group behavior.

No significant differences were found between men and women in the percentages of parts of speech or ratios of subordination. Men spoke more and used longer words in both speaking and writing. There was more variation among the men in most categories of speaking and writing.

Conclusions

Under the limited conditions of the present study, speech is shown to be nearly as complex as writing but different in the kinds of subordination used and length of clauses. The words of speech are slightly longer than those of writing and as "difficult" but characterized by a repression and a tendency to be less exact and specific.

Microfilm \$2.95; Xerox \$10.00. 225 pages.

THE SUPERMAN AND STRUCTURE IN GEORGE BERNARD SHAW'S PLAYS:
A STUDY IN DIALECTIC ACTION

(L. C. Card No. Mic 59-630)

Daniel James Leary, Ph.D. Syracuse University, 1958

Supervisor: H. O. Waite

This study is an attempt to establish the existence in Shaw's thought pattern of a fundamental conflict between spirit and matter, and to demonstrate how this conflict is given expression through Shaw's dramatic projection of Supermen figures, representing the various stages of 'dialectic action', of spirit's struggle with matter. I use the Superman as a focal point both to organize Shaw's philo-

sophic outlook and to apply it toward a fuller understanding of the characterization, the form, and the technique of his dramatic work. In the central section of this dissertation, five of Shaw's Superman plays, chronologically arranged, are closely analyzed to reveal the growing complexity of the dramatist's world view. This core is bounded by a first chapter attempting to compose the rich assortment of factors and theories which contributed to his working philosophy, and by a final chapter revealing the partial breakdown of Shaw's 'dialectic action' in the discouraged Supermen of the last plays.

The dialectic synthesis which is the framework of Chapter I has the following divisions: Thesis--Shaw's view of the Life-Force, which apparently owes much to Schopenhauer's "Will" and Bergson's "Elan Vital"; Antithesis--Shaw's view of 'matter', which Shaw admits is based on the biology of Samuel Butler and Lamarck; and Synthesis--Shaw's view of the Superman, whom he considers to be a product of the conflict between Life-Force--and matter.

Chapters II to VI represent five major variations in Shaw's ideas, and in his dramatic presentation of those ideas. The first stage is devoted to the dialectic action in Caesar and Cleopatra (1898) which takes the form of a struggle between a vital, "original" man and a traditionbound society, between an open and a closed morality. Man and Superman (1901-03), is a depiction of the war of the sexes, in which the male's purpose is to aid Life in elevating itself to heights of consciousness not previously attained, while the female's purpose is to safeguard and maintain the level which has been already attained. The conflict between the doer and the thinker, the life of action and the life of contemplation is realized in Major Barbara (1905) by Cusins who marries the spiritual Barbara and joins the firm of Andrew Undershaft. Next, in Back to Methuselah (1918-20) Shaw reveals his growing, post-war doubts about man's power to alter life, for he claims that only a Superman who has lived for three hundred years and who has dissociated himself from matter can achieve human maturity. A new balance, however, is achieved in the fluctuating pattern of success and failure in the drama of Saint Joan (1923), for in this play's heroine, one finds the perfect merging of spirit and matter, one finds all the necessary qualities of the Superman: originality, practicality, spirituality, adaptability and, in a sense, immortality.

The last chapter deals with four of the plays after Saint Joan and though the action of these final plays is no longer a relentlessly advancing synthesis, though the Supermen in these plays appear discouraged, still tentatively these last plays carry forward the ideas introduced in earlier plays. Thus, Too True To Be Good (1932) is treated as one of Shaw's last statements about closed and open morality, The Millionairess (1936) as a reiteration of Shaw's view of the sex struggle, The Apple Cart (1929) as a variation on the problem of the contemplative in a world of action, and The Simpleton of the Unexpected Isles (1934) as another statement about salvation in the future.

Microfilm \$6.25; Xerox \$22.00. 490 pages.

ANNE THACKERAY RITCHIE AND THE VICTORIAN LITERARY ARISTOCRACY

(L. C. Card No. Mic 58-7406)

Ove Jacob Hjort Preus, Ph.D. University of Minnesota, 1958

Anne Thackeray Ritchie was Thackeray's daughter, the sister-in-law of Leslie Stephen, and, as a result, the aunt of Virginia Woolf. An account of the life and writings of Lady Ritchie is significant for three reasons: 1) she was one of the popular writers of fiction in mid-Victorian England; 2) she was a friend of almost all of the eminent artists and writers of her day; and 3) she was an important link between the great Victorian writers and the twentieth-century inheritors of their tradition. In this dissertation, I have tried to describe her writing, to piece together her relationships with her contemporaries, and to show how she was linked to the following generation of writers-particularly to Virginia Woolf.

In the years from 1860 to 1885, Lady Ritchie became well-known as a writer of popular, domestic fiction. After her novels and stories appeared serially in the Cornhill magazine, they were published in one or two volume editions. The Story of Elizabeth (1863) was her first popular success, after which The Village on the Cliff (1867) went into three editions and Old Kensington (1873) into five. After her best novel, Mrs. Dymond (1885), appeared, Lady Ritchie virtually ceased to write fiction, devoting her time to work she considered more important: her literary reminiscences and biographical introductions to her father's works. In her later years, her contemporaries honored her by electing her a Fellow of the Royal Society of Literature in 1903 and president of the English Association in 1912.

The pages of Lady Ritchie's non-fictional writing are filled with interesting bits of information and anecdotes of general interest, but some of the chapters in her life are of special interest to the literary historian. In the sixties she was a prominent member of the colony of writers and artists attracted by Tennyson and G. F. Watts in Freshwater, on the Isle of Wight. In the early seventies she figured in one of Browning's major poetical efforts, "Red Cotton Night Cap Country.". In the eighties she made a valiant but ineffectual attempt to serve as the peacemaker in the famous altercation which took place when Browning discovered FitzGerald had written, "Mrs. Browning's death is rather a relief to me, I must say: no more Aurora Leighs, thank God!"

As Lady Ritchie lived on into the twentieth century, she became a symbol of the Victorian age to the young writers who inherited the traditions of the Victorian literary aristocracy. To members of the Bloomsbury group, she became the venerable Aunt Annie. To Virginia Woolf, Anne Ritchie represented both what was admirable and what was distasteful in the tradition they both knew they represented. In Mrs. Woolf's second novel, Night and Day, in which she satirizes the interlocking directorate of families which produced so many illustrious members, she used Lady Ritchie as the model for Mrs. Hilbery, the principal representative of the old order. Although in Night and Day Virginia Woolf announces her rebellion against the Victorian ideals and conventions Mrs. Hilbery represents, she betrays considerable admiration for the great Victorian literary families. As shown in the writings of Virginia Woolf, Lady Ritchie became an interesting link between the great Victorian writers and their successors in the twentieth century.

Microfilm \$3.40; Xerox \$11.60. 262 pages.

LANGUAGE AND LITERATURE, CLASSICAL

A STUDY OF ALTERNATIVE READINGS IN THE HEBREW TEXT OF THE BOOK OF ISAIAH, AND THEIR RELATION TO THE OLD GREEK AND THE GREEK RECENSIONS

(L. C. Card No. Mic 58-7812)

James Franklin Armstrong, Ph.D. Princeton University, 1958

Since the publication of Benjamin Kennicott's Vetus Testamentum Hebraicum cum variis lectionibus (1776-1780) and Johann B. de Rossi's Variae Lectiones Veteris Testamenti (1784-1788), the predominant opinion among Old Testament textual scholars has been that all extant Hebrew manuscripts (now excepting the Dead Sea Scrolls) go back to a single standard text - namely, the Masoretic text - and that variant readings contained in those manuscripts are post-Masoretic. In recent years, however, new interest has arisen concerning the variants contained in Hebrew manuscripts, and studies have begun to indicate that former judgments regarding their worth must be modified. This dissertation has undertaken an examination of the variant readings in Hebrew manuscripts of Isaiah and has concerned itself primarily with two questions: (a) whether or not those variant readings, drawn from the collations of Kennicott and de Rossi, preserve a significant number of pre-Masoretic traditions, rather than post-Masoretic alterations of a standard text; and (b) the extent to which variant readings already imbedded in the Masoretic text itself (a well-recognized phenomenon investigated by Torrey, Boström, and Zimmermann, among others) are also supported by readings in Hebrew manuscripts or in the Greek.

In pursuing the investigation, the Hebrew variants have been carefully compared with the Old Greek and recensions therefrom, as well as with the St. Mark's Isaiah Manuscript and Sukenik's Isaiah Scroll. In each case the fundamental principles of Hebrew and Greek grammar have been kept in mind, and the endeavor has been made to avoid citing variants which result in impossible Hebrew constructions or which are supported by faulty Greek. Likewise obvious errors in transmission have been eliminated from the references, except in a few cases where the Old Greek or the Greek recensions appear to have been based upon a text in which such an error was perpetuated.

The main portion of the dissertation (Chapter Two) is divided into a series of Sections, each of which analyzes a particular type of variant reading (e.g., the addition of prepositions, changes in grammatical number, etc.); these Sections are further sub-divided according to the kind of support (e.g., Old Greek, Lucianic revision, etc.) which the variants receive.

Were there to be found but a few instances in which variants from Kennicott and de Rossi have support in the

Greek or the Dead Sea Scrolls, these agreements could be accounted for by coincidence. Chapter Two, however, yields hundreds of cases of such agreements - often of striking character - far too many to be attributed to accident. It must be concluded, therefore, that although the Hebrew manuscripts have undoubtedly been normalized by scribes in the direction of the Masoretic text, still there remain many traces of pre-Masoretic alternative readings. Evidently the development of the Masoretic text represents a gradual sifting of alternative - yet essentially similar traditions, until a "standard" text evolved which gradually came to predominate. Very often the Old Greek and recensions therefrom were based on Hebrew traditions which were not adopted into the Masoretic text. Although Sukenik's Isaiah Manuscript lies very close to the Masoretic text, the same cannot be said for the St. Mark's Scroll. On the contrary, the latter contains more pre-Masoretic alternative readings than do other extant Isaiah manuscripts and represents better than the other manuscripts the textual fluidity which existed prior to, or apart from, the dominance of the Masoretic text.

The theory that early custodians of the text, either groups or individual scribes, sometimes introduced variants into the text itself by the device of conflation is also borne out by this investigation. Many instances are found in which Hebrew or Greek manuscripts contain but one of the supposed dual traditions.

Microfilm \$2.30; Xerox \$8.00. 175 pages.

LANGUAGE AND LITERATURE, LINGUISTICS

GERMANIC DIALECT EVOLUTION IN LEXICO-STATISTIC TIME PERSPECTIVE

(L. C. Card No. Mic 58-5928)

Walter W. Arndt, Ph.D. The University of North Carolina, 1956

Supervisor: George S. Lane

Two linguists, M. Swadesh and R. E. Lees, have recently evolved an experimental method of dating ancient vocabulary samples and determining dates of divergence of related dialects. The method is based on lexical statistics. Its originators claim to have established as a working principle that the inventory of basic root morphemes of any language at any time is subject to renewal at a rate which is virtually constant and uniform intralingually and interlingually. Thus when two semantically identical but chronologically distant samples of the root vocabulary of any dialect are compared, the degree of correspondence of terms can be utilized as an objective measure of the time interval separating them. Similarly, the mutual retention ratio of two samples of related dialects enables one by the same chronometric technique to establish the date when the correspondence of terms between them was complete, i.e., when the two dialects were identical.

This lexico-statistic dating technique, usually called glottochronology, has not as yet been applied to any sizable

system of related dialects of known historical phonology. The present study undertakes to apply it to the Germanic branch of the Indo-European family. The evolution of the Germanic dialect system and its internal relationships are well explored chronologically and phonologically. It thus affords a number of check-points for important events of linguistic history. The study can therefore pursue a twofold aim. First, to test the accuracy of the glottochronological method by the independent controls of historical (external) and phonological (internal) dating. Second, if the method passes this test, to establish which, if any, of the existing rival theories of Germanic dialect evolution is best supported by lexico-statistic chronology. The procedure involves choosing a sample of basic semantic items and running "time depths," i.e., establishing divergence dates, from comparisons of all available and significant pairings of samples drawn from contemporary and ancient dialects.

Chapter I is devoted to a discussion of the theory and the technique built on it. Its premisses and practical limitations are analyzed, and certain working rules and theoretical refinements are introduced to fit it for the purpose in hand. Chapter II reviews past and present theories of Germanic linguistic history. It then confronts the most influential of these, the tripartite theory of genealogical descent, with glottochronological evidence which, itself well in accord with historic data, conflicts with it in essential points. In Chapter III, the same evidence is rearranged for comparison with the conclusions of the modern school of German "wave" theorists and dialect geographers, who attribute to synthesis through cultural association an important role in the formation of literary dialects. This time, the two types of evidence are found to harmonize with each other in most areas without major conflicts. Cautious collation and interpretation of the data by areas yields the outlines of a chronological account of Germanic dialect evolution.

Microfilm \$2.50; Xerox \$8.60. 190 pages.

BIOGRAPHY IN THE ANGLO-NORMAN DIALECT OF OLD FRENCH

(L. C. Card No. Mic 58-5946)

Arthur Robert Harden, Ph.D. The University of North Carolina, 1958

Supervisor: Dr. Urban Tigner Holmes, Jr.

The Anglo-Norman contribution to the biographical literature of the Middle Ages is rich and distinguished and ranges in quality from the most naive type of saint's life to the only genuinely secular biography in Old French. Beginning with the baldest kind of hagiography, these works reach a summit of perfection in two works. The first is a superlative life history of a transitional nature, that is concerning a subject who is both saint and layman, La Vie de Saint Thomas, le Martyr. The second is the study which most closely approximates our concept of biography as a genuine search for personality, L'Histoire de Guillaume le Maréchal. These works seem, in part, to have originated, firstly, as a literary form to rival in England the popular chanson de geste of France; secondly, as a means

of arousing national sentiment when the island's autonomy-both political and ecclesiastical--was most seriously threatened by continental powers.

The heroes and heroines of these lives come from the most diverse social, professional, and national backgrounds. Their biographers seek to appeal, through their use of the vernacular and the additions they may make to a Latin original when one existed, to the widest possible audience. The motivations for their compositions vary from those of sincere and humble acts of contrition to those of the more worldly reward to be received from a commission. The finest poems exhibit the following characteristics: they attempt to treat the entire life of the subject, not just the portion before the final climax; they resort to documentation when possible; they show care in matters of chronology; they assume a sense of detachment when judging the actions of either their hero or his enemies; they strive to be accurate and they frankly acknowledge their skepticism when certain information appears controversial; they make careful use of speech and gesture as a means of characterization; they seek to entertain as well as edify. For English scholars these poems offer an opportunity to fill a lacuna in their history of biography. For French students they provide an interesting study in the evolution of a genre. For all they grant an opportunity to observe the eternally fascinating story of how another fellow creature fared in Microfilm \$2.40; Xerox \$8.40. 184 pages.

ENGLISH LOANWORDS IN PERSIAN: A STUDY IN LANGUAGE AND CULTURE

(L. C. Card No. Mic 58-3976)

Mohammad Ali Jazayery, Ph.D. The University of Texas, 1958

Supervisor: Dr. E. Bagby Atwood

From the turn of the nineteenth century a process of Westernization, or modernization, has been going on in Iran. This situation is reflected in the hundreds of European words that have been adopted into Persian in recent decades. The largest group of these loanwords consists of French borrowings, a fact that points to the profound influence of France in Iran before the second World War. There are, however, a considerable number of words from other languages, including those from English, which constitute the main topic of the present study.

Britain's continuous contacts with Iran date from the first decade of the nineteenth century. The British have been very active in Iran since then — both diplomatically and in commerce. In the latter connection, they have gained a number of concessions, the most important of them being that for the Anglo-Iranian Oil Company. Iran's cultural relations with the United States of America began in the 1830's when an American religious mission started its educational work in Iran. However, it was only after the Second World War that these relations reached significant proportions. The most important factors contributing to the expansion of these relations have been the missionary schools, the presence of American personnel in Iran, and the extensive educational and cultural exchanges between the two countries.

Iran's cultural contacts with the English-speaking world have naturally affected the Persian vocabulary. The number of English loanwords has increased since the Second World War, demonstrating the fact that English, rather than French, now exerts the stronger influence.

The Glossary, which makes up Chapter IV of this study, represents the first systematic attempt to collect the English loanwords in Persian. Something over 700 items are listed, each traced to its original English form. The sources from which these words were collected are indicated in each case. They include published sources as well as a number of native informants. The geographical limitation of words is sometimes indicated, and occasionally synonyms and hybrid compounds are given.

The most numerous groups of English loanwords in Persian are made up, first, of technological (chiefly automotive) terms, and, second, of terms used in connection with recreation, especially sports. These are indeed the fields in which the speakers of Persian are most indebted to those of English. In southern Iran the A.I.O.C. has developed a flourishing oil industry. This is reflected in the considerable number of English terms used in this part of the country in connection with the production, refining, and transportation of petroleum. We may thus say that in the great majority of instances, English loanwords in Persian are an indication of "what one nation has taught another."

On the purely linguistic side, we have given a complete account of the phonological treatment of English words as they pass into Persian usage. Such phenomena as "underdifferentiation of phonemes," and the influence of the writing systems (both of English and Persian) on pronunciation are pointed out.

Semantic changes, which are also considered, have been relatively few. This is explainable by the fact that almost all of the loanwords represent tangible objects, in which the ambiguity leading to some types of semantic changes is usually lacking. Moreover, semantic changes (both in native words and in foreign ones) take some time to develop, and English borrowings in Persian are nearly all of recent date.

Microfilm \$2.70; Xerox \$9.40. 206 pages.

THE PROVERB IN THE MEDIEVAL SPANISH EXEMPLA

(L. C. Card No. Mic 58-5950)

James Henry Johnson, Ph.D. The University of North Carolina, 1958

Supervisor: John E. Keller

This dissertation is a study of the subject matter, style and form of the proverbs contained in the Spanish medieval exempla as follows: Calila e Dimna, Libro de los engaños e assayamientos de las mugeres, Barlaam y Josaphat, Castigos e documentos para bien vivir ordenados por el rey don Sancho IV, Conde Lucanor, Libro de los gatos and Libro de los enxemplos por a.b.c.

The body of the dissertation is divided into three parts. Part I, in outline form, is a study of the various types of proverbs and their style. Two examples have been chosen

from the exempla to illustrate each type. In Part II, which includes all the proverbs found, they are grouped under headings according to the specific idea expressed. Two indices, one by object and the other by cultural sphere, are appended to Part II. Part III is an alphabetical listing of all the proverbs found. Its purpose is to allow the reader to determine quickly whether a given proverb is included in the collection. The Introduction includes a detailed study on the various sources of proverbs. Examples from the exempla are numerous and references to other collections of Spanish proverbs are frequent. By means of cross references and footnotes the reader may locate a given proverb in any of the sections where it is treated.

The exempla, in addition to popular proverbs, contain a number of literary proverbs and those invented with a conscious effort to preserve rhyme. They include many sayings translated from foreign languages, notably Latin and Arabic, as well as those coming from Biblical and classical writings.

A vast number of the proverbs found in the <u>exempla</u> deal with general admonitions and particularly with moral counsels. The most popular subjects are Christian charity, government, law, social relations, warfare, family life, conjugal life, health, and animal life. Proverbs having to do with trades, agriculture and hunting are rare.

As regards stylistic elements the metaphor is the most common figure of speech. Simile, hyperbole and antithesis are less common than would be normally expected. The rhetorical figure of personification, play on words, and the rhymed proverb are all numerically important. Proverbs of the type which begin with an indication of a series of members involved are well represented in the exempla. The odd literary form, the Priamel, is seen in the exempla in a stage of its development, intermingled with other forms.

Finally, this study has shown that the proverbs of the medieval Spanish exempla offer a great deal more variety of subjects and forms than had previously been believed. Studies of the proverbs of medieval Spain in general should prove highly rewarding.

Microfilm \$3.20; Xerox \$11.00. 246 pages.

THE STRUCTURE OF THE ROMAN DE THEBES

(L. C. Card No. Mic 58-5960)

Mary Paschal, Ph.D. The University of North Carolina, 1958

Supervisor: Dr. Urban T. Holmes, Jr.

The Roman de Thèbes (1150-55) is the first complete romance which appeared in Old French literature. Its importance arises from the fact that it is the first of the genre and that it set the form for the romances that were to follow -- the octosyllabic rhymed couplet. To the anonymous French poet of Thèbes, we are perhaps indebted for the increased interest in France of the twelfth century in the study of the Ancients, both their culture and their literature. In the treatment of love and in the enlarged role played by women, the Roman de Thèbes is a forerunner of all the novels which have followed it down to the

present day. Immediately it must have had its influence on the writings of Benoît de Sainte-More and of Chrétien de Troyes.

In this thesis, a study has been made of previous writings on the origin of the romance; of the Arts poétiques of the twelfth century, and of the stylistics of the author of Thèbes; of the sources of the Roman de Thèbes and modifications made by the French poet; of the love element and the position of women in Thèbes; and finally, of the reflections of daily living in the twelfth century which are apparent in Thèbes.

Microfilm \$2.25; Xerox \$7.80. 169 pages.

PHILOLOGICAL CONSIDERATIONS OF LA CHANÇUN DE WILLAME

(L. C. Card No. Mic 58-3761)

Guérard Piffard, Ph.D. Stanford University, 1957

Informed opinion is agreed that La Chanson de Roland and La Chançun de Willame are extremely old, possibly the oldest known French heroic epic poems. Since the Willame's first publication in 1903, it has recieved the attention of almost two generations of specialists in Old French philology and literature. Although many false data concerning particular words and forms have been corrected in partial word lists, a complete etymological glossary of the Willame is necessary for a thorough study of the text.

The purposes of this study are: 1) to compile a complete etymological glossary of La Chançun de Willame; 2) to make comments upon this glossary, from a philological standpoint, with a view to clarifying the difficulties encountered; 3) to draw conclusions from this study which will lead to a more accurate determination of the date of the original poem.

Each word and its variations were filed and a complete listing of the individual occurrences of these words were entered on each card. The etymologies of the individual words, variants, and forms were then sought in the available etymological studies. These lists were then compared with the glossaries of the three previous editors in conjunction with reference to a photostatic copy of the original manuscript. Many of the vocables had been omitted from the most comprehensive existing glossary and there was disagreement with some of the entries. Reasons and explanations were sought for the omissions, and a reconciliation of the disagreements was attempted.

The succeeding chapters contain comments respectively on the omissions in the editors' glossaries, points of disagreement with the editors, and words of Germanic origin. Etymological obscurities are clarified, and, thereby, textual interpretations.

In consideration of the philological factors supported by examples discussed in the body of the study, the date of origin of <u>La Chançun de Willame</u> can be fixed philologically at some point in the third quarter of the twelfth century, that is, 1150-1175 A.D.

Microfilm \$2.60; Xerox \$9.00. 198 pages.

A CONTRIBUTION TO THE HISTORY OF THE WORD "VEREIN" (ZUR GESCHICHTE DES WORTES "VEREIN")

(Publication No. 24,533)

Guenter George Schmalz, Ph.D. The Ohio State University, 1952

The purpose of the study is to trace the semantic development of the word "Verein".

As it is used in the modern sense, this word embodies the meanings of association, club, coalition, company, confederation, corporation, league, partnership, society, and union. This multiplicity of meanings is an indication of its popularity. All of these words signify organizations of some sort but for the most part are political organizations. It is; therefore; to be surmised that the word "Verein", too, originally had a definite political background. To show what this political background was and the significance it held for the German cultural scene is one of the aims of the dissertation.

However, the word "Verein" has not always had the concrete organizational aspect indicated by the ten words mentioned above. It is true that in the MHG period the political flavor of the word is very prominent, it being applied to alliances between potentates. In the eighteenth century, however, it was used mostly in a general or abstract sense. It represented an ideological union, a blending of qualities, a combination of forces, or a harmonious joining together of two or more people of similar sertiments. Thus the expression "Sie lebten in schönem Verein" simply implies they lived together in complete harmony, while the compound "Freundschaftsverein", the analogous counterpart to a "Freundschaftsbund", indicates nothing more than the existence of a "bond of friendship" between people. In the dissertation this type of non-organizational "Verein" is referred to as "Verein I".

The term "Verein II" is employed to indicate the modern kind of "Verein", that is, an organization, a society, a group of people banded together for definite purposes which may be of a social, artistic, or political nature. It has all the functions and peculiarities of the modern society or club, i.e., it has elected officials, a president and a treasurer, by-laws, regular meetings, etc. It is the object of the dissertation to trace the transition of the original type of "Verein" (I) to the more recent type (II), a change that is not brought out with sufficient clarity in the standard German dictionaries.

Chapter I is thus devoted to a discussion of three of the most important dictionaries, those of Adelung, Campe, and Grimm. Adelung is the first lexicographer to consider the word important enough as to warrant its inclusion in his dictionary. He, however, gives only one quotation (from the sixteenth century) illustrating the use of the word "Verein". Campe some thirty years later doesn't offer much more. Adelung and Campe both are unaware of the existence of the MHG usage of the word "Verein" but for their own time are conscious only of the "Verein I" type. Almost a century later the Deutsches Wörterbuch, in an article written by Wülcker in 1888, still contents itself with an inadequate listing of "Verein I" quotations, while taking cognizance, however, of the existence of a second, organizational type of "Verein" by quoting from the works of Auerbach (1843). The sketchiness of the article, which in no way gives a picture of the motivating forces and influences behind the word "Verein", made it mandatory for

the writer to find his own sources and materials, on the basis of which the cultural significance of the term "Verein" might be brought to light.

Therefore the attempt is made in the second chapter to depict the cultural and philosophical background of the eighteenth century and to show the influences which helped shape the meaning of the word "Verein" and its linguistic competitors.

The third chapter discusses a number of terms that belong to the same sphere of ideas and denote various phases of the social, religious and political life. Accordingly, words like "Zirkel", "Loge", and "Orden" enter into the picture along with a number of others. The greater portion of the chapter is devoted to the development of the word "Bund", a term that proved to be an important predecessor of the word "Verein". In discussing the friendship cult so characteristic for the eighteenth century words like "Freundschaftsbund" and "Liebesbund" are encountered. "Herzensbund" and a "Seelenbund" are manifestations of the sentimentalism pervading that period. Of course, the word "Bund" is a characteristic political term, such as the words "Völkerbund" and "Staatsbund". Thus in the political sphere too the term "Bund" helped to prepare the way for the appearance of the word "Verein" upon the same political plane. However, the turn of the nineteenth century saw an uneasy, divided Germany follow with great interest the development of the French Revolution. She could not help but notice the part that organizations such as the Jacobin societies played in that development. Hence the political elements in words like "Bund" came more and more to the surface.

The fourth and fifth chapters give details of the system of secret societies in connection with the study of the words "Gesellschaft," "Klub," "Orden," and "Verbindung." In a Germany governed by autocratic controls and reactionary measures these words became socially undesirable and politically unacceptable. Consequently the word "Verein", as yet unencumbered by such a stigma, could and did step into the breech, and began to assume the function of those terms which it pushed into the background.

Chapter VI brings a greatly expanded list of examples of "Verein I" culled from the works of eighteenth and early nineteenth century writers. This chapter brings a long but by no means complete list.

The seventh chapter deals with an historical event to which great importance is attributed in the transition from "Verein I" to "Verein II". For in the year 1808 a group of Prussian patriots founded in the city of Königsberg an organization to which they gave the name "Tugendbund" or "Sittlich-wissenschaftlicher Verein". To the best of my knowledge this was the first organized society that describes itself as a "Verein." In the documents of this society the usage of the eighteenth century is still very much in evidence in that they can constantly extend the bond of friendship between members, but on the other hand its thorough organization has all the characteristics of the later type. In its wake follow a great number of organizations of which a list is given in Chapter X.

The last chapter intends to show by a number of early examples that critical and satirical tendencies were directed against the extravagances of what is now called "Vereinsmeierei" and are almost as old as the modern type of "Verein" itself. 209 pages. \$2.75. Mic 59-933

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LANGUAGE AND LITERATURE, MODERN

A CRITICAL STUDY OF DOROTHY M. RICHARDSON'S PILGRIMAGE

(L. C. Card No. Mic 58-3639)

Caesar Robert Blake, Ph.D. University of Michigan, 1958

The purpose of this study is to determine, by critical analysis, what the precise character of Dorothy M. Richardson's <u>Pilgrimage</u> is as a novel, and to determine further if it coheres aesthetically as a work of literary art. The analyses are concerned primarily with describing the novel's meaning, structure, and style and their aesthetic relationship, rather than with the application to <u>Pilgrimage</u> of particular normative theories of fiction.

Chapter I is an introductory account of the novel's history and critical fortunes, organized to focus the specific purpose of this study. Chapter II is an analysis of the meaning which unifies the twelve-volume sequence comprising Pilgrimage. Miriam Henderson's cumulative impressions are examined for their conceptual or propositional idea-content, whether stated explicitly or implied in events. The recurrent motifs in those impressions are then shown to come together as the meaning which unifies Pilgrimage: Mariam's search for and achievement of a sense of her reality as woman and artist in profoundly affirmative mysticism. The emergence of this meaning shows a parallel between Pilgrimage, as Miss Richardson arranged its parts for the 1938 edition, and the historic "Mystic Way." The type of intellectual and psychological growth which, for the developing mystic, is called awakening, purification, and illumination, describes the course of Mariam's quest for reality. At a broadly philosophical level it is her exploration and eventual rejection of scientific realism, philosophical idealism, and Bergsonian vitalism before achieving mystical vision. At the level of human affairs, this development is reflected in Miriam's changing attitudes and actions regarding art, sex, religion, politics, interpersonal relations, and the like. At a personal level, illumination is Miriam's certainty, through vision, of the reality of her "feminine" consciousness and thus of her real identity.

Chapters III, IV and V analyze, respectively, structure, style, and characterization. The novel's structure is shown to be that of a chronicle novel adapted to the peculiar necessities of stream-of-consciousness narration, with time, space, and "value" controls achieved through the manipulation of inner and outer time movement, presentation in picture and scene, and restriction of the narrative perspective to a single point of view. Miss Richardson's style is analyzed as the impressionistic use of poetic devices to imitate the levels of consciousness and to objectify in thematic images and symbols the quality of the sensibility which the novel exploits. The method and function of characterization in Pilgrimage are described and related to the novel's meaning and structure. In each of these chapters, Miss Richardson's techniques are analyzed specifically and considered in relation to her meaning and to her purpose: the creation in novelistic art of an illusion as closely imitative of subjective life as a free use of language permits and meaningful communication demands.

Chapter VI summarizes the analyses and asserts two positive conclusions: that the twelve "chapters" of Pil-

grimage cohere in meaning and form as a single novel, and that it has clear integrity as a work of literary art. On the basis of the analyses and conclusions, it is suggested that we re-consider the experimental character of Miss Richardson's adaptation and extension of James's point of view principle and something of his style. Similarly, suggestions are made for comparing Richardson, Proust, Joyce, and Woolf on the basis of their respective concepts of "illumination," "privileged moment," "epiphany," "the moment" and the differences in meaning and structure those concepts involve. It is suggested finally that Pilgrimage, as this study describes it, be read as a singular attempt to create in art a world of belief, value, and order necessary in the chaos of modern life.

Microfilm \$3.20; Xerox \$11.00. 248 pages.

THE PRINCIPLE OF POETIC JUSTICE ILLUSTRATED IN RESTORATION TRAGEDY

(L. C. Card No. Mic 58-5940)

John Dale Ebbs, Ph.D. The University of North Carolina, 1958

Supervisor: Dougald MacMillan

Writers on poetic justice in Restoration tragedy have generally condemned the principle. After tracing the historical development of poetic justice in tragedy and establishing a definition of the term, this dissertation attempts to show how the principle is illustrated in Restoration tragic drama. The date boundaries are from 1656 to 1700, and only plays that were performed are considered.

An examination of Aristotle's Poetics reveals that Aristotle, though familiar with the general notion of poetic justice, did not recommend it. The beginning and development of the principle are to be found in the literary criticism of France during the sixteenth and seventeenth centuries. Scaliger in his Poetics (1561) establishes the first two essential elements by maintaining that the purpose of the dramatic poet and tragedy is didactic, and that the encouragement of the love of virtue and hatred of vice is the primary instruction of tragedy. The third essential element is anticipated by Vauquelin; in L'Art Poétique (1605) he maintains that tragedy should favor the virtuous. From these beginnings a fully developed system of rewards and punishments is presented by La Mesnardière in his Poëtique (1639), is codified as the principal rule of tragedy by d'Aubignac in his Pratique du Théâtre (1657), and, as evidenced by the critical remarks of Corneille, Boileau, Rapin, and Le Bossu, is fully accepted by the French.

In 1660 England possessed no real tragic theory. The English accepted the rules of the French; and because the principle of poetic justice was one of these rules, it was accepted. Early French influence can be seen in critical works by Davenant and Hobbes. Dryden and Rymer both accept the French rule; and Rymer, heavily influenced by La Mesnardière, presents a system of exact rewards and punishments. Based upon Rymer's system of "poetical justice," a concise definition of the principle as it was conceived by the English during the Restoration is established.

Using this definition as a guide, we clearly see the

illustration of the principle in representative Restoration tragic drama. An examination of fifteen plays -- opera, tragicomedy, heroic tragedy, tragedy, and adaptation of Shakespearean tragedy -- reveals that only one, Lee's heroic tragedy Gloriana, is entirely lacking in a depiction of the principle. The fourteen others show that an attempt has been made either to teach the love of virtue and hatred of vice, or to depict an exact poetic justice, which, in addition to teaching the love of virtue and hatred of vice, inflicts severe punishments and gives to the virtuous their ultimate rewards. In the first category belong The Siege of Rhodes, The Royal Shepherdess, and Macbeth. In the second, King Arthur, The Generall, The Conquest of Granada, Charles the Eighth of France, Don Carlos, All for Love, Venice Preserved, Don Sebastian, The Mourning Bride, Troilus and Cressida, and King Lear. Gloriana was a complete failure on the stage; all of the others were highly successful.

The examination of representative Restoration tragic drama makes clear that the principle was in agreement with standards of the time and was an integral part of the Restoration critic and dramatist's idea of tragedy. An analysis in an appendix of the controversy over poetic justice between Joseph Addison and John Dennis tends to confirm these conclusions.

Microfilm \$2.85; Xerox \$9.80. 218 pages.

THE LITERARY ORIGINS OF "REALIDAD" BY BENITO PEREZ GALDOS

(L. C. Card No. Mic 58-7398)

Shirley Russell Fite, Ph.D. University of Minnesota, 1958

Adviser: Raymond L. Grismer

This study indicates some of the specific sources Pérez Galdós utilized in the creation of the novel, Realidad. The Fuencarral murder trial provided Galdós with the germinating idea for the novel. During the many weeks the Spanish author spent attending the judicail proceedings, he became interested in the elusive nature of absolute reality, and fascinated by the many factors which distort and disguise absolute truth. Therefore, in La incógnita, he presents a completely objective account of a mysterious death and demonstrates that knowledge gained from perceivable experience is insufficient to reveal truth. By an associative link, Galdós applied this theory to literary techniques and thereby points out an intrinsic weakness of naturalist literature.

This conviction leads him to a consideration of a contemporary literary reaction to naturalism, the psychological novels of Paul Bourget. A comparison of several Bourget novels and Realidad indicates that the Spanish author fused elements of Bourget's technique into Realidad. Besides the profound attention given to the psychological delineation of the major characters, Galdós also uses thematic material and analysis of personality traits. A search into the soul of man quite naturally leads to the close scrutiny of man's spiritual resources, which brings to mind the work of Leo Tolstoy.

Anna Karenina and Realidad share several points of

contact, the most obvious of which is the love triangle plot situation. A close reading reveals other specific affinities; for example, similarities in the characters of the major figures, the emphasis upon the opposition of Natural law and Social law, the attention given to the spiritual life of the characters, and the influence of a corrupt environment upon the actions of the principal figures. The insidious authority of traditionalism suggests the literary work of the Norwegian dramatist, Henrik Ibsen.

The evidence demonstrates that the heroine of A Doll's House figures as one of the models for the Galdos heroine, and parallels are also seen in the characterization of the husbands in both works. The evil effect of conventional adherence to established custom, so clearly brought out in Ghosts, is another problem treated in Realidad. Also, Ibsen's use of the drama as a vehicle to convey his message of social reform may have served as one of the ori-

gins for the dialogue form of Galdós novel.

Finally, the character Orozco is shown to be an example of the krausista lay saint. Galdos' interpretation of this character indicates that he had become somewhat more critical of the philosophy which, during his earlier years, he had considered to offer so much promise for Spain. However, Orozco's triumph must be construed as the triumph of idealism over determinism, the philosophy of the naturalist school.

It is significant that these sources, with the exception of the Fuencarral trial, have been collected from foreign literatures. Besides indicating the catholic reading taste of Galdós, this fact would appear to demonstrate a desire on his part to introduce contemporary European thought to his Spanish readers. Furthermore, if Galdós did have this purpose in mind, the corrollary theory may be suggested that he also hoped to re-incorporate Spain and Spanish literature into the current of contemporary European literary tradition.

Obviously, these sources constitute only a partial picture of the many elements which must have played a role in the creation of Realidad. The basic genius of the author stands revealed in his ability to select, combine and fuse these diverse materials into the unified whole of his own artistic creation.

Microfilm \$3.05; Xerox \$10.40. 234 pages.

THE ETHNOCENTRIC ATTITUDES OF SOME JEWISH AMERICAN WRITERS: EDUCATIONAL IMPLICATIONS

(L. C. Card No. Mic 58-2824)

Abraham Herbert Greenberg, Ph.D. Yeshiva University, 1956

This study has considered the ethnocentric attitudes of some Jewish American writers by examining their writings and, where feasible, by personal interviews. The point of reference for analysing four basic approaches to ethnic adjustment is derived from Isaac B. Berkson's Theories of Americanization... (New York: Teachers College, 1920.)

Mary Antin's autobiography, The Promised Land, was examined as an example of complete assimilation. Anzia Yezierska's writings, especially Hungry Hearts and Red Ribbon on a White Horse, described the Americanization of the immigrant in the melting-pot. Meyer Levin's

autobiography, In Search, expounded the belief that cultural pluralism is possible and desirable in America. Ludwig Lewisohn's writings since 1925, especially The Island Within, The Answer and The American Jew, espoused "voluntary segregation" to ghettoes where positive Jewish values could be encouraged.

This study and its correlation with similar studies of other ethnic groups should provide in courses of literature appreciation, theme writing, and social studies basic experiences of democratic processes and democratic values to facilitate pupil adjustment in a world of divergent Microfilm \$2.55; Xerox \$8.80. 195 pages. cultures.

THE FUNCTION OF "THE DEATH OF ARTHUR" IN MALORY'S TRAGEDY OF THE ROUND TABLE

(L. C. Card No. Mic 59-614)

Wilfred Louis Guerin, Jr., Ph.D. Tulane University, 1958

Chairman: R. M. Lumiansky

Thomas Malory's Morte Darthur for centuries has been accepted as one book; however, opinions as to the artistic success of its structure and characterization, the consistency and care in the handling of its details, and the clarity of its theme have varied. When Eugene Vinaver's edition of Malory was published in 1947 with the title The Works of Sir Thomas Malory, his examination of the story, of its alleged irregularities, and of new material found in the Winchester Manuscript prompted him to formulate the theory that Malory did not intend a single, unified story but rather eight separate romances. To the last of these he has reserved the title "The Death of Arthur," seeing it as a tragedy with human, not spiritual significance.

This dissertation is a close study of the eighth section, its sources, and its relation to the rest of Malory's work. From such a study I have found that Malory intended "The Death of Arthur" to be the climactic and artistic conclusion of a unified epic-romance, the tragedy of which results from the sins and errors of the characters during the entire story. The tragedy takes cogency from the ideals of the Round Table, formulated as early as the first section, and from the constant, medieval sense of religion, of man

in relation to God, to good, and to evil.

Malory's technique for making "The Death of Arthur" both aesthetically and thematically satisfactory is demon-

strable in the following ways:

1) Contrary to most critical opinion, I have found that Malory uses not the French Mort Artu but the Middle-English stanzaic poem Le Morte Arthur as his primary source for "The Death of Arthur." He prefers its narrative flow, directness, and phraseology. Whenever he finds it inadequate for his interpretation of the tragedy he resorts to his own invention or to the psychological perception of the Mort Artu.

2) In the first seven sections Malory provides many Links to and preparations for the events and themes in the eighth section. Aware that his tragedy must grow from consistent characters and motivated plot, he first stresses such matters as Merlin's prophecies, Gawain's vengeance, Gareth's character, Arthur's suspicions, Lancelot's premonitions. Later, eager to remind his readers of events that have led to the tragedy, he recalls Lancelot's partial Grail success, the deaths of Tristram and Lamorak, the contrastingly happy marriage of Pelleas and Nineve. He revises the conclusions of the alliterative Morte Arthure and the prose Tristan to make them look forward to rather than contradict "The Death of Arthur."

3) The architectonic pattern of the section is very much like the rising and falling action of the regular fiveact drama. Furthermore, Malory carefully balances and varies its scenes by using dialogue, conferences, and different kinds of conflict. The first seven sections of the Morte Darthur, when viewed in their structural relation to the eighth, are seen to describe a unified plot develop-

ment towards a tragic conclusion.

4) The tragedy of the Morte Darthur is both moving and enriching. In an excellently conceived and well-executed treatment of his central characters, Malory shows the change of fortune that they bring upon themselves and each other, and the psychological maturation and selfrealization that they achieve. Their tragedy and the related failure of the Round Table ideal are not unrelieved, for Malory sincerely believes in the medieval otherworld philosophy of life. Accordingly, most of the principal characters achieve a spiritual catharsis and sanctification; however, they achieve this state not as parts of the Round Table society but as individuals following the path described earlier in Dante's Comedy.

Microfilm \$4.00; Xerox \$13.60. 311 pages.

CARDINAL NEWMAN AS A LITERARY CRITIC

(L. C. Card No. Mic 58-7400)

Theodore Norman Hong, Ph.D. University of Minnesota, 1958

Cardinal Newman's views on the nature and function of literature are considered in the present dissertation against a background of some of his religious opinions. The essential unity of his religious opinions is illustrated in terms of his lifelong insistence on the principle of dogma, on holiness, and on a sacramental view of the universe. Newman held that any proper religion must be dogmatic. The dogmas of Christianity reveal as much of the truth as men are able to comprehend and at the same time as much of the truth as human language is able to express. Dogma for Newman always implied action, living a holy life. All actions must be judged according to absolute Christian standards. Newman also held that the dogmas of Christianity are closely related to a sacramental view of the universe, the view that material phenomena are both types and instruments of unseen spiritual realities. Although dogmas are types and instruments of spiritual truth, they are necessarily only shadows of that truth because they are expressed in the feeble language of human beings. In the same way, many parts of the Bible are only shadows of the spiritual truth they attempt to convey. This strictly religious sacramentalism is so closely related to Newman's views on literature that almost all of his views may be included in a sacramental theory of literature which he held throughout his life.

According to Newman's essay on "Poetry, with Reference

to Aristotle's Poetics" (1829), the mind of the true poet is one filled with eternal forms of beauty and perfection. It is a mind which sees sacramentally, a mind which is especially sensitive to the shadows of Divine realities in the material universe. The true poet must approximate to a right moral center if he is to perceive things sacramentally, that is, poetically. Newman always held that there is a clear distinction between the perception of poetical beauty and the expression of it. Every proper Christian is a poet in the sense that he sees sacramentally although he may not have the slightest talent for composition. But the literary genius described by Newman in The Idea of a University is the master of the two-fold Logos, the thought and the word. In the genius the poetical talent, or the mind sensitive to feelings, thoughts and visions, is joined to the talent for composition. Nevertheless, even the greatest genius is seldom if ever able to put into words the whole picture of his vision. Literature or poetry as written is essentially sacramental in that it is only a shadow of the vision in the writer's mind or imagination.

Insofar as literature or poetry tends to look below the surface of things and to draw men's minds away from the material to the spiritual world, it tends to perform a proper religious function. But Newman felt that there was always the danger for both the author and the reader of letting the literary exercise of the imagination and affections take the place of action. If holy actions are the proper goal in life, as Newman of course insisted they are, literature must be judged in terms of its effect on the reader. Mere realism in literature can easily result in a morbid concern with the things of this world. Poetry or, more generally, fiction must be poetically just if it is to satisfy the natural yearnings of the reader for an ideal truth which this world does not give. Newman's theory of literature does not then include tragedy or pure realism. The best literature must be idealistic and sacramental.

Microfilm \$2.45; Xerox \$8.60. 187 pages.

THE AMERICAN INDIAN IN THE AMERICAN NOVEL (1875-1950)

(L. C. Card No. Mic 58-5918)

George Elwood Jones, Jr., Ph.D. New York University, 1958

Chairman: Professor Louise N. Rosenblatt

The purpose of this study was to determine the treatment of the Indian in the American novel from 1875 to 1950 in order to establish possible trends in the literary handling of the Indian, and to interpret their literary and social significance.

This involved selecting criteria for determining the character of the depictions, and for establishing the literary traits of each work to find if the treatment seemed to parallel contemporary literary developments. It involved investigating whether the treatment seemed to reflect the influence of historical events or social movements. Viewed chronologically for evidence of trends or emphases, the findings were interpreted in relation to their literary and social context.

Only novels for adults giving prominence to Indian

characters living within the present boundaries of the United States were included in the study. The novels were chosen from titles listed in standard fiction guides, under headings related to the Indian, or found under the names of tribes in card catalogues of the Library of Congress. Of the more than five hundred checked, 175 were found most clearly fulfilling the specific requirements.

Systematic analyses of the literary treatments of the Indian were based on a critical reading of each novel as a work of fiction, with findings recorded under such categories as physical appearance, physical condition, athletic prowess, intellectual qualities, creative expression, personality traits, family roles, tribal roles, inter-tribal and inter-racial roles. The selected novels were analyzed to determine how and to what extent the Indian appeared physically attractive, intellectually capable, and socially successful in major and minor roles. The study sought further to determine which historical figures, tribes, events and settings were emphasized, and how problems of education, religion and miscegenation were interpreted.

The investigation revealed that although only a small proportion of novels gave prominence to the Indian, such novels appeared in increasing numbers, and the Indian received more favorable treatment than might have been expected.

He was usually presented as physically attractive, athletic and capable of endurance. Although some earlier novels implied that he was intellectually inferior, many novels after 1925 viewed him as intellectually equal to whites.

The majority of the novels noted his courage and dependability, often emphasizing devotion to a white friend, adopted child or sweetheart. The objectionable trait most often described was cruelty.

Among roles that displayed his best abilities were those of hunter, warrior, scout and guide. The role of medicine man, which often depicted his worst traits, was given a more sympathetic treatment after 1925.

After 1925, a decrease in stereotyped Indian characters, and a more realistic treatment of the Indian evidently paralleled the general trend toward realism in the American novel.

Novels using the most frequent setting, the West in the late nineteenth century, tended to contrast the progressive pioneer and the "vanishing" Indian. After 1930, the novels seldom implied that the Indian was inferior. Tribes most often treated, the Navajo, Sioux and Apache, were usually depicted as resistant to non-Indian influences.

Some of the novels published between 1930 and 1950 recognized some of the white man's past errors in planning land allotment and educational policies for the Indian. Historical Indians remembered as foes were sympathetically portrayed in some recent novels.

Contemporary with the passing of the Indian Reorganization Act of 1934, the novels reflected a changed attitude. The Indian, once pictured as needing to imitate whites, was interpreted by some novelists as having a right to be himself and to retain his cultural heritage.

Anthropological contributions helped the serious novelist achieve greater authenticity. This led to more appreciative interpretations of Indian culture. The novels also showed an increased tolerance of miscegenation.

Microfilm \$7.35; Xerox \$25.68. 577 pages.

FRANCE IN FONTANE'S LIFE AND WORKS

(L. C. Card No. Mic 59-31)

George Lainen Karlsson, Ph.D. University of Pittsburgh, 1958

Theodor Fontane (1819-1898) was a descendant of the French Protestants who had to flee France upon the revocation of the edict of Nantes in 1685.

This French heritage has often been referred to as the source for the strong French element encountered in the author's works. In one case, the percentage of the French and German blood in the author and his parents was computed in order to explain his French nature.

Since an explanation based on environmental influences appears scientifically more sound, a study has been made of the French influences during his formative years, and these have then been traced to the author's works.

Fontane's belief in the function of heritage was apparently instrumental in bringing about a feeling of being partly French, and this feeling, in turn, apparently affected his attitude toward France and everything French. His descriptions of French men and women seem to reflect a pre-established attitude. He was always impressed by them. His passion for making descriptions is interesting, in that it reveals a tendency to create types. He seems to be particularly fond of the Midi-type, the type which was represented by both his parents and his wife.

The effect of the French influences in childhood can, furthermore, be felt in his attitude toward various aspects of French culture. In order to bring into focus the entire content of Fontane's relationship with France it was necessary to examine his knowledge of, and his interest in French literature, art, politics, and religion.

Briefly it can be stated that Fontane had only a superficial knowledge of French literature, and that there seems to be no direct French literary influence upon him.

Fontane's studies of French art and architecture were also rather shallow. Aesthetic beauty as such invariably played a secondary role. He insisted that sculpture and architecture always should reveal some kind of historic connection.

With the exception of some priests, whose meaningless phrases he detested, Fontane was always inclined to praise the French individual. The nation, as a whole, however, was bitterly criticized. He felt that there was no respect for religion and no respect for the glorious past of the nation. He found materialism so dominant that everything could be bought.

The findings indicate that the French cultural content in Fontane's works was not due to a desire to make a profound scholarly study of French culture, but rather to a personal urge to pursue activities in areas of his own special interest. If we then consider the fact that the areas of interest developed in childhood are generally either identical, or similar to those pursued in adult years, then we can conclude that the early French influences must have played a most important role in giving directions to Fontane's life and works. The adult interest in religion forms an exception because the parental influence in this area was negligible. Microfilm \$2.00; Xerox \$4.60. 89 pages.

THOMAS LODGE'S "WITS MISERIE AND THE WORLDS MADNESSE": EDITED WITH INTRODUCTION AND NOTES. (VOLUME I: INTRODUCTION AND TEXT. VOLUME II: NOTES AND BIBLIOGRAPHY.)

(L. C. Card No. Mic 58-3685)

Rev. Robert John Kearns, Ph.D. University of Michigan, 1958

This 115-page pamphlet of Lodge's, Wits Miserie and the Worlds Madnesse: Discovering the Deuils Incarnat of This Age, was chosen for editing and annotation because of its own literary value, its contribution to a clearer understanding of Elizabethan morals and manners, and its remarkable treatment of Theophrastan humor and characters. Wits Miserie has the structure of a medieval sermon on the seven deadly sins, similar to that of the Parson in the Canterbury Tales. Each sin is subdivided and each subdivision is personified as a character, much like the Theophrastan moral "Characters." The subtitle, "Discouering the Deuils Incarnat of This Age," best describes the contents of the book. Some of these "Deuils Incarnat" are "Scandale and Detraction," "Brawling Contention." "Arrogancy," "Ravishment," "Lying," "Adulation," "Sedition the Trouble-World," "Boasting," "Hypocrisy," "Usury," "Contempt," "Adultery," "Sleepiness," et cetera. And each of the seven deadly sins is given an arch-devil to represent it; e.g., Leviathan (Pride), Mamon (Avarice), Asmodeus (Luxury), Beelzebub (Envy), Baalberith (Ire), Beelphogor (Gluttony), Astaroth (Sloth).

The pamphlet is available only in the limited edition (210 copies) produced by Sir Edmund Gosse in 1883 for the Hunterian Club, The Complete Works of Thomas Lodge, and in the four original copies of the 1596 edition still extant.

Wits Miserie is a mosaic of quotations from classical authors, the Bible, the Fathers of the Church, the Talmud, and various contemporary writings of the sixteenth century. Lodge, however, obtained his material from various source books, treatises on moral theology, anthologies of quotations, et cetera. The Introduction to the dissertation discusses these secondary source books and also contains a short treatment of the Theophrastan and satirical elements in the pamphlet, as well as a discussion of the three other prose pamphlets by Lodge that have a bearing on Wits Miserie.

The edition in the dissertation is based on the text in the British Museum (C. 30. d. 19). Everything appears as it does in Lodge's text, except that obvious printing errors in spelling and punctuation have been corrected and a list of the changes noted in the errata. Other changes which were made, but not pointed out, are: the consistent use of the modern "s" and "r"; the change of "vv" to "w"; "æ" and "œ" to "ae" and "oe"; and the filling out of the syncopated "m" and "n" forms.

In the Notes, the second volume of the dissertation, various terms and obscure passages are glossarized, and an attempt made to identify the original authors or sources of as many citations as possible. In compiling this pamphlet, Lodge translated a good deal from the French and Latin, and therefore, except for the Theophrastan portraits, most of the work is from the minds of others. Lodge's contribution, a not inconsiderable one, was in his fresh approach to an old subject.

Microfilm \$5.75; Xerox \$20.40. 452 pages.

COTTON MATHER AND THE PLAIN STYLE

(L. C. Card No. Mic 58-3708)

William Reid Manierre II, Ph.D. University of Michigan, 1958

Three closely related purposes govern this study of the style of Cotton Mather's Magnalia Christi Americana. The first two of these are to describe Mather's style and to distinguish between it and that of other New England writers of the seventeenth century. The third is to trace what is distinctive in Mather's style to its ultimate source in the Puritan "world picture" -- to those intellectual and emotional currents which define New England Puritanism. The method is descriptive and comparative, characterized by frequent movements from matters stylistic to matters more purely intellectual -- from style to Weltanschauung.

Section I describes the inherent dichotomy between Puritan literary theory and practice. Puritan philosophy led naturally to the doctrine of the plain style, but important elements in that philosophy led just as naturally to a style that was anything but plain. Considered inclusively, the New England "intellectual milieu" explains not only the relatively unadorned styles of Bradford and Winthrop but also the highly decorated styles of Ward and Mather. This section is largely devoted to theoretical concerns-to placing New England literaty theory within the broader intellectual context which gave it birth and which led, at times, to styles seemingly at variance with it. Following chapters, which constitute Section II, are set against this background and consequently within the context of a defined hierarchy of values and ideas.

Generally stated, the two most conspicuous features of the Magnalia's style are its immoderate reliance on the knowledge derived from books and its ingenious play on the sounds and meanings of words. In no other seventeenth century American work is there to be found so striking a combination of verbal ingenuity and learned ornament. Section II describes in detail these characteristics of Mather's prose, relates them to the purposes Mather set for himself as an author, and correlates these purposes

with those of the society within which he wrote.

Every eccentricity of the Magnalia's style is understandable in terms of the New England "intellectual milieu," the particular decade during which the book was written, and the emotional bent of Mather's character. He combined in himself the piety of the early Puritan and the morality of the eighteenth century Yankee; faith in the ways of religion and faith in the ways of science. But the Magnalia represents but one of these poles. It is the most extended single defense of the old philosophy against the new--an impassioned plea that New England revert to the principles and practices of an earlier generation. The Addisonian prose of Franklin reflects the victory of the new tradition, while the baroque prose of the Magnalia reflects the struggle for survival waged by the older intellectual and emotional synthesis prior to its final defeat in the eighteenth century.

Microfilm \$3.75; Xerox \$12.80. 292 pages.

THE CLASSICAL TRADITION IN SPANISH DRAMATIC THEORY OF THE SIXTEENTH AND SEVENTEENTH CENTURIES

(L. C. Card No. Mic 58-7511)

William Carlton Mc Crary, Ph.D. The University of Wisconsin, 1958

Supervisor: Professor Everett W. Hesse

The history of world criticism has overlooked the Spanish contribution to Renaissance literary theory from the time of Saintsbury and Spingarn up to the present day. Only a few scholars in the area of Spanish studies have investigated the thought of Golden Age critics. Aristotle and Horace were read and explicated in Spain as elsewhere during the Renaissance. The purpose of this dissertation is to examine the aesthetic assumptions of the classically oriented theorists together with those of Lope's followers in order to demonstrate the persistence of classical thought in the poetics of both schools. The arrangement of the material is thematic throughout. No attempt, therefore, has been made to study the works chronologically. In this way the various interpretations of Aristotle and Horace may be shown simultaneously. The results are the following:

1. Aristotle and Horace together constituted the basis of Spanish Renaissance dramatic theory of both groups of thinkers.

2. The difference between the traditionalists and the defenders of the comedia are relatively few.

3. The modernist critics reinterpreted the ancient

authorities in order to justify the baroque theater. 4. The national drama was thus accompanied by a well

developed critical literature which explained its aesthetic in terms of classical assumptions.

5. The modernists evolved a critical methodology based on an empirical approach to art, which, they argued, was Aristotle's procedure.

6. The defenders of Lope elaborated a theory of literary history which accounted for the development of aesthetic forms and the function of national taste in the production of art.

7. Finally, the modernists felt that neither Lope nor the comedia represented a reaction against classical standards, but rather a new approach to drama quite compatible with the ancient masters. It may be asserted, therefore, that their work attempted to integrate authority with experience in order to accomodate traditional dramatic theory to a modern vision of the theater.

Microfilm \$2.90; Xerox \$10.00. 222 pages.

THE GOD-IDEAS OF THE LEADING HEBREW POETS DURING THE PERIOD 1933-1948

(L. C. Card No. Mic 58-7624)

Noah H. Rosenbloom, Ph.D. New York University, 1958

Chairman: Professor Abraham I. Katsh

The purpose of this study is to identify and analyze the nature of the God-ideas in the poetry of the leading modern Hebrew poets during 1933 - 1948, and relate those ideas, if possible, to the Nazi persecutions of the Jews in Europe and the Arab disturbances in Palestine during the same period.

Fifty leading modern Hebrew poets were selected whose literary careers have been at least twenty years old and whose writings appeared in books. These poets were divided into five groups: Poets of the National Hebrew Renaissance, Modernistic Hebrew Poets, American Hebrew Poets, Hebrew Poets, and 'Lesser' Hebrew Poets.

The works of these poets, written during 1933 - 1948, were analyzed, compared, and contrasted with the works of the same respective poets antedating that period, in the light of the following five criteria: the extent of the Godconcentration in their works; the connotation of God's reality in their references to the Deity; the aspect of God's ethicality and His relationship to the manifestations of evil; the nature of God as a living conscious personality; and the specific relationship of God to the people of Israel.

The poetry of the leading Hebrew poets during 1933 - 1948 manifests that despite the brevity of time there is a considerable multifariousness of God concepts. This dissimilarity of ideas is not contingent upon age, geographic location, nor upon the personal experiences of the poets. Most of the poets are not philosophers or theologians. They react to given events spontaneously, and consequently such glaring contradictions, uncommon in a carefully cogitated system of speculative thought.

Hebrew poetry during this period and prior to it shows less God-concentration than during the Biblical, Talmudic, and medieval periods. Some Hebrew poets, notably the poetesses, refrain from this theme altogether. Though many poets make references to God, only to a minority He is real and has objective existence. The majority of the Hebrew poets refer to the Deity out of habit or merely in a metaphorical sense. Among the minority of Hebrew poets to whom God is real, there are some who challenge His morality and ethicality. In spite of the atheistic or agnostic views maintained by many Hebrew poets, they refer to God, nevertheless, in terms of a living conscious personality.

Predominantly the Hebrew poets, regardless of their religious point of view, maintain that there is a unique relationship between God and the people of Israel. This relationship frequently entails positive or negative implications.

There seems to exist a remarkable consistency in the God-ideas maintained by the respective leading modern Hebrew poets during 1933 - 1948 and the ones maintained by them previously. The sufferings of the Jews, and the manifestations of evil during the period under consideration have not altered the God-ideas of the respective Hebrew poets. They have, however, intensified the protests against God among poets who were inclined to protest against God's providence previously.

This consistency of the leading Hebrew poets concerning their God-ideas and their failure to alter them and relate them to the cataclysmic events of their time can perhaps be attributable to the "cultural-lag". The latter is responsible for the lack of synchronization of the God-ideas with the rapidly changing political, social, and economic events of the times.

Microfilm \$4.25; Xerox \$14.40. 331 pages.

A CLASSIFICATION OF MOTIFS IN THE TRADITIONAL BALLADS OF SPAIN

(L. C. Card No. Mic 58-5966)

Hugh Nelson Seay, Jr., Ph.D. The University of North Carolina, 1958

Please see abstract on Page 2052
Microfilm \$3.80; Xerox \$12.80. 295 pages.

THE OLD TESTAMENT DRAMA OF THE SIGLO DE ORO

(L. C. Card No. Mic 58-5967)

Robert Newton Shervill, Ph.D. The University of North Carolina, 1958

Supervisor: Sturgis E. Leavitt

So far as can be determined, the Golden Age Old Testament theater consists of some twenty-seven full-length comedias, two of which are no longer extant. The majority of the authors of these plays follow the same dramatic technique and reflect the same strength and weakness associated with their secular pieces. Humorous subplots provide dramatic relief, and infrequently parallel the main plot on an inferior plane. Humor is generally confined to the minor characters, and seldom intrudes upon the serious thematic materials.

As a rule, the biblical stories serve as a basic framework to which is added a considerable amount of non-biblical legendary material, drawn from Jewish folklore and history. With few exceptions period customs and manners are inaccurately reproduced. Strict adherence to the chronology of historic events is rare, while flagrant anachronisms are not infrequent.

Music, pageantry, tramoyas, and supernatural appearances are employed more extensively than in the secular historical comedias of the period. Thus visual and aural entertainment is frequently substituted for dramatic appeal. Stylistically, Old Testament drama differs little from the secular pieces of the period.

Old Testament drama is not a sounding board for Church dogma and doctrine. Biblical themes are apparently chosen on the same basis as secular historical themes, for their ready dramatic interpretation and their entertainment value, not to mention their relative freedom from possible censorial criticism on moral grounds.

Women play a more important role in Old Testament drama than in the Bible stories from which they are drawn. Female characterization is laid open to the broadest of interpretations, possibly for reasons of "box-office" appeal. Characterization in Lope de Vega's Old Testament pieces differs radically from that offered in his secular comedias. He presents and magnifies some of the baser qualities of womanhood, while portraying in his leading male characters his conception of the ideal man.

Only two authors follow what seems to be a planned series of Old Testament comedias. Lope de Vega presents the five basic loves of man, which are shown to culminate in the love of God. Tirso's three plays follow a central theme based on the power of love. Honor as a dramatic theme is as greatly exploited in Old Testament drama as in the secular plays of the period.

Lope de Vega's authorship of La corona derribada y vara de Moisés seems clearly indicated, while La sibila de Oriente is basically the work of Calderón with additions to plot and characterization provided by an anonymous author.

Microfilm \$6.65; Xerox \$23.40. 524 pages.

MATHEMATICS

SOME ASYMPTOTIC PROPERTIES OF A MAXIMUM LIKELIHOOD ESTIMATOR

(L. C. Card No. Mic 58-7438)

Billy Joe Attebery, Ph.D. University of Missouri, 1958

Supervisor: Hugh D. Brunk

This paper is concerned with the consistency and asymptotic normality of a maximum likelihood estimator when the sample values are values of independent random variables X_1 , X_2 , ---. For each i=1,2,3, --- and for each $\theta \in A$, a fixed subset of a k-dimensional Cartesian space, the random variable x_i has a density function $f_i(x,\theta)$ with respect to a measure λ on the Borel sets. The common parameter θ has a true but unknown value $\theta_0 \in A$ and the density function $f_i(x,\theta)$ may depend on i.

In the literature theorems concerning the consistency and asymptotic normality of a maximum likelihood estimator have been proven when the density function does not depend on i. This paper states conditions under which a maximum likelihood estimator will be consistent where the density function may depend on i. The major result is in Theorem 4 where conditions are stated under which a linear combination of the components of a consistent maximum likelihood estimator will be asymptotically normal where the density function may depend on i.

Microfilm \$2.00; Xerox \$4.00. 73 pages.

HOMOLOGY OF LOOP SPACES

(L. C. Card No. Mic 59-7)

William Browder, Ph.D. Princeton University, 1958

The homology rings of iterated loop spaces of iterated suspensions are computed with various coefficients; explicitly $H_*(\Omega^n s^n X; Z_2)$ and $H_*(\Omega^n s^n X; Z_p)$ for $p > ^n/_2$. These rings are shown to be isomorphic to free commutative algebra over certain graded modules which are defined. Over Z_2 this is done with the aid of the homology operations of Kudo and Araki together with a new operation of two variables. This last operation, together with long spectral sequence and Hopf-algebra arguments are used with Zp. Cohomology is computed for $\Omega^{n-1} s^n X$ with same coefficient groups. The results enable us to define homology operations in the category of n-fold loop spaces for Zp analogous to those of Kudo and Araki, but these operations are not natural.

Microfilm \$2.00; Xerox \$3.60. 64 pages.

ANALYSIS OF FARM AND HOME DEVELOPMENT BENCHMARK SURVEY RESULTS AND ASSOCIATED STATISTICAL PROBLEMS

(L. C. Card No. Mic 58-7573)

Marion Ritchie Bryson, Ph.D. Iowa State College, 1958

Supervisor: H. O. Hartley

This study is the outgrowth of some problems which arose in connection with a research study, the purpose of which was to measure the effectiveness of a farm and home development extension program. In order to make the desired measures, a benchmark survey was conducted on 442 young farm families in ten Iowa counties. Farm families in five of these counties were to receive the farm and home development and those in the other five were not. After a period of four years, the same families were to be interviewed again and the progress of the farm and home development families with respect to several criteria, was to be compared with the progress of the control group.

Within each county a stratified two stage sample with one primary per stratum was taken. The primaries were chosen with equal probability and the farms within the primary were chosen with a fixed rate. It was impossible to determine prior to a visit whether or not a farm fell into the eligible population, defined by restrictions on age, marital status, and size of operation. In order to estimate the size of a primary, a preliminary sample was drawn, with which it was possible to estimate the proportion of total farms which were eligible.

The first problem considered was that of estimating the population size of eligible farms in each selected primary. From this estimate, the sample size of eligible farms in each primary was computed. The variance of this variable sample size was worked out, along with the covariance of the sample sizes in two primaries. This covariance is negative since the total sample size in a county is a fixed constant.

The second problem was that of comparing the benchmark counties, using benchmark data, on several criteria. The principal statistical problem here was the estimation of the variances when only one primary was drawn in each stratum. It was impossible to evaluate the program at the writing of this thesis since the follow-up survey had not been done.

The third problem was a comparison of the characteristics of those families who cooperate with the farm and home development with those who do not.

The fourth problem was a study of inverse binomial and hypergeometric sampling. The work in this area was reviewed and enlarged upon. Both the problems of the distribution of sample size and the estimation of proportions were considered. The correspondence of the finite and the infinite cases was demonstrated for each of these cases.

The final problem considered was that of estimating the proportion of a population which fell into a given class

by observing the class into which each element was placed by each of two classifiers. It was assumed that each element was subject to classification error, depending upon who was classifying and into which class the element fell. Microfilm \$2.00; Xerox \$6.40. 135 pages.

APPROXIMATIONS TO CONTINUOUS OPERATORS ON FUNCTION SPACES

(L. C. Card No. Mic 58-1961)

Leroy John Derr, Ph.D. Tulane University, 1957

Chairman: B. J. Pettis

This paper is concerned with the determination of approximating forms for abstract functions defined on subsets of Banach spaces. One purpose in developing this theory is for application to the case of operators on function spaces, such as non-linear differential operators, and solutions of related equations.

Let C be the Banach algebra of all real continuous functions defined on a closed bounded real interval I and let A be a sub-algebra. Let F be a subset of A and S a class of operators defined on F and with range in A.

The problem of approximations to the operators in S is attacked first by extending M. Stone's "Generalized Weierstrass Approximation Theorem" to the operator case. Hence, take F to be compact and let S be the continuous operators. If S_0 is a subset of S that has certain prescribed separating properties then S may be uniformly approximated by a sequence of 'polynomials' (i.e. elements of the algebraic ring on S_0).

With this result established concerning the existence of uniform polynomial approximations, an analysis of their structure follows in detail. The sub-algebra $\bf A$ is also further specified as a particular class of infinitely differentiable functions. The content of the separating set $\bf S_0$ is also studied in greater detail.

These polynomials are then given a more detailed expression and the more difficult question of determining the coefficients (scalars) is raised. A particular type of polynomial expansion termed a Generalized Taylor Series is considered and conditions are given under which this approximation may be obtained from the Weierstrass Theorem and be valid for the operator. A final theorem in this section then gives formulas for the coefficients of the Generalized Taylor Series in terms of the operator's variations (Gateaux or G-derivatives).

So far this theory has been developed from the Generalized Weierstrass Approximation Theorem and using uniform convergence in the Banach space C. It is now desired to consider a specialized norm on the sub-algebra so chosen that the differential operators $\frac{d^n}{dx^n}$ will be continuous. Then by making use of the formulas developed earlier for scalar coefficients a Generalized Taylor Series with remainder is given together with some convergence criterion. Application is then made of this approximation and an example of a solution of a non-linear differential equation is carried out.

The use of the variation or G-derivative of an operator

presents certain difficulties since the domain of definition has been taken as a compact set while the usual notion of G-derivative is defined on an open or finitely-open set. Now, turning to the case of complex Banach spaces, the subject of G-differentiability is discussed further and a question is raised concerning extensions of operators which are continuous on a compact set to be continuous and G-differentiable in open domains. Here the stronger and often more desirable concept of Fréchet differentiability is also brought in.

A compact convex circled set is chosen as domain and a notion of G-differentiability on F (the compact set) is defined. The final result is to extend operators continuous and G-differentiable on F to operators which are continuous and G-differentiable on a set H which is open in the closed linear span of F. The set H contains all of the circled set F except possibly elements of maximum modulus.

Microfilm \$2.00; Xerox \$4.60. 88 pages.

ASYMPTOTIC POWER AND INDEPENDENCE OF CERTAIN CLASSES OF TESTS ON CATEGORICAL DATA

(L. C. Card No. Mic 58-5937)

Earl Louis Diamond, Ph.D.
The University of North Carolina, 1958

Supervisor: S. N. Roy

A "product-multinomial sample" is defined as one having a distribution of the form

$$\prod_{i=1}^{r} [n_{i0}! \prod_{j=1}^{s} p_{ij}^{n_{ij}} / \prod_{j=1}^{s} n_{ij}!]$$

where

$$\sum_{j=1}^{S} p_{ij} = 1 \text{ and } \sum_{j=1}^{S} n_{ij} = n_{i0} \text{ for } i = 1, \dots, r, \text{ and } \sum_{i=1}^{r} n_{i0} = n.$$

Suppose we are given rs functions $p_{ij}(\theta)$ and u functions $f_m(\theta)$ of t unknown parameters $\theta_1, \dots, \theta_t$ where $\theta' = (\theta_1, \dots, \theta_t)$, $t \le rs-r$ and u < t. These functions are supposed to satisfy certain conditions over a non-degenerate open interval Ω in the t-dimensional space of the θ_k 's.

We consider hypotheses and alternatives of the following forms:

(i) H_0 : $p_{ij} = p_{ij}(\underline{\theta})$ for i = 1, ..., r and j = 1, ..., ssubject to $f_m(\underline{\theta}) = 0$ for m = 1, ..., u. H_n : $p_{ijn} = p_{ij}(\underline{\overline{\theta}}) + d_{ij} / \sqrt{n}$ subject to $f_m(\underline{\theta}) = 0$ where $\sum_{j=1}^{S} d_{ij} = 0$ but not all $d_{ij} = 0$ for i = 1, ..., r.

(ii) We are given that $p_{ij} = p_{ij}(\underline{\theta})$ for i = 1, ..., r and j = 1, ..., s. $H_0: f_m(\underline{\theta}) = 0$ for m = 1, ..., u. $H_n: f_m(\underline{\overline{\theta}}) = c_m / \sqrt{n}$ where not all $c_m = 0$.

For each type of test a test statistic is formed by solving an appropriate set of modified chi-square minimum equations subject to H_0 for θ and substituting in an appropriate formula for the sample chi-square statistic. In each case this statistic has, under H_0 , a limiting chi-square distribution with certain degrees of freedom. It is shown in each case that under H_n the statistic has a

limiting non-central chi-square distribution with certain degrees of freedom and a certain non-centrality parameter.

It is shown that a hypothesis of the form

$$H_0: f_m(p_{11}, ..., p_{1s}, ..., p_{r1}, ..., p_{rs}) = 0$$

for $m = 1, ..., u \le rs-r$ is a special case of (ii).

In the case when r = 1 we have a "single-multinomial sample" and the same types of hypotheses and alternatives may be considered.

A necessary and sufficient condition for the asymptotic independence in probability of two tests under the respective null hypotheses is derived for each type of test and a method of placing confidence limits on the non-centrality parameter of the non-central chi-square distribution is derived.

Several examples of specific tests are included.

Microfilm \$2.00; Xerox \$4.80. 92 pages.

ON SUMMABILITY BY A CLASS OF UPPER-TRIANGULAR MATRICES

(L. C. Card No. Mic 59-26)

Stanley Frost Dice, Ph.D. University of Pittsburgh, 1958

Let $\sum_{0}^{\infty} q_i$ converge and $q_i > 0$, and set $Q_n = \sum_{n=0}^{\infty} q_i$. A

positive regular matrix K(q) is defined, having the elements $k_{mn} = q_n/Q_m$ for $n \ge m$, $k_{mn} = 0$ for n < m. This paper investigates properties of K(q) and inclusion relations with common matrix methods of summability.

K(q) has a unique right inverse with the elements $k_{mm} = Q_m/q_m$, $k_{m,m+1} = -Q_{m+1}/q_m$, $k_{mn} = 0$ otherwise. If $Q_m/q_m < M$, K(q) is equivalent to convergence. The ratio

 $r_n(q) = Q_n/q_n$ has the properties $r_n(q) > 1$ and $\sum_{n=0}^{\infty} (1/r_n)$

divergent. To each sequence $\{r_n\}$, with $r_n > 1$ and $\sum\limits_{0}^{\infty}$ (1/

 r_n) divergent, corresponding methods K(q) can be constructed.

A sufficient, but not necessary, condition that K(q) be included by another method K(p) of the same type is that $\{r_n(q)\}$ be K(p)-bounded. If $\{p_n/q_n\}$ is monotonic and if $r_n(q)/r_n(p) < H$, K(p) includes K(q). If $\{p_n/q_n\}$ decreases monotonically, the second hypothesis may be replaced by the condition $\lim_{n \to \infty} p_n r_n(q) = 0$. If the equivalent conditions $p_n = kq_n(k > 0)$ and $r_n(p) = r_n(q)$ hold (for $n > N_0$ at least), then K(p) and K(q) are equivalent.

K(q) is not included by the binary method.

A sufficient, but not necessary, condition that (C,1) include K(q) is that $\{r_n(q)\}$ be (C,1)-bounded; a necessary condition, that $r_n(q)/n < M$. If $\{q_n\}$ decreases monotonically, $\{r_n\}$ increases monotonically or $|r_n-r_{n-1}| < H$, then (C,1) includes K(q) if and only if $r_n(q)/n < M$.

If $\{q_n\}$ decreases monotonically and $nq_n/Q_n < M$, or if $|q_n - q_{n+1}| < Hq_n/(n+1)$, then K(q) includes (C,1). If $\{q_n\}$ decreases monotonically and if $0 < M_1 < nq/Q_n < M_2$, then K(q) and (C,1) are equivalent.

For k > 1, (C,k) includes K(q) if $\{r_n(q)\}$ is (C,k)-bounded. For each k, there exist K(q) not included by (C,k).

If A is a positive regular matrix and if $\{r_n(q)\}$ is Abounded, A includes K(q). If A is row-finite there are K(q) not included by A.

Microfilm \$2.00; Xerox \$3.00. 44 pages.

INVOLUTION SEMIGROUPS

(L. C. Card No. Mic 58-659)

David James Foulis, Ph.D. Tulane University, 1958

Chairman: Fred B. Wright

The paper concerns itself with multiplicatively written semigroups S equipped with a distinguished antiautomorphic involution *:S- \rightarrow S and with a unit 1, such a semigroup being called a *-semigroup. By a projection in the *-semigroup S we mean an element e such that $e = e^2 = e^*$. A two sided ideal K in S is called a focal ideal in case, whenever M is a subset of S containing either one or two elements, the right ideal of S consisting of all elements b such that Mb \subset K is a principal right ideal generated by a projection e = M'. The mapping $x-\rightarrow \{x\}' = x'$ from elements of S into projections in S is called the focal mapping induced by K.

It is proved that each focal ideal K is a principal ideal generated by a unique central projection. Define P' to be the image of S under the focal mapping x - - - x', and if e, f are projections belonging to P' with ef = e, write $e \le f$. The relation $e \le p$ partially orders P', and, indeed, P' is a lattice relative to this partial order. It is proved that the lattice P' is orthocomplemented and satisfies the weak modular identity. Moreover, P' is a Boolean algebra if

and only if it is a sub-semigroup of S.

Given an element a in S, we define a mapping $\phi_a: P'-\to P'$ by the prescription $(e)\phi_a=(ea)''$ for e in P'. The mappings ϕ_a thus obtained preserve least upper bounds and map zero into zero in the lattice P'; they are, in the terminology of P. Halmos, hemimorphisms of P'. It is shown that ϕ_a $\phi_b = \phi_{ab}$ holds for any pair of elements a,b in S, i.e., that the mapping $a-\to\phi_a$ yields a (not necessarily faithful) representation of S into the semigroup of hemimorphisms of the lattice P', hence, in the event that P' is a Boolean algebra, we obtain a (not necessarily faithful) representation of S into a semigroup of binary relations on the Stone space dual to P'.

The notion of an element a in S being "range-closed" is next introduced. We define a to be range-closed in case whenever e is a projection in P' with $\overline{(e)\phi_a*}=\overline{(a*)}$ ", then $e' \wedge a'' = 1'$. The motivation for this definition derives from the case of the multiplicative semigroup of all bounded operators on a Hilbert space. Making use of the notion of "range-closed" elements, the so-called "non-singular" elements of S are singled out, and sufficient conditions are found for this set of elements to be a group.

The paper closes with the derivation of sufficient conditions for the *-semigroup S to be isomorphic to the multiplicative semigroup of all n by n matrices over a semiring. Microfilm \$2.00; Xerox \$6.20. 126 pages.

INTEGRABILITY OF TRIGONOMETRIC SERIES AND LAPLACE-STIELTJES TRANSFORMS

(L. C. Card No. Mic 58-5753)

José María González-Fernández, Ph.D. Northwestern University, 1958

Suppose that g(x) is a real valued function defined on $(0,\pi)$ and let $b_n = \frac{2}{\pi} \int_0^\pi g(x) \sin nx \, dx$. We show that under appropriate conditions on g(x) for $\gamma = 2j, j = 1,2,\cdots$, $x^{-\gamma}g(x) \in L(0,\pi) \iff \sum n^{\gamma-1} (\log n) |b_n| < \infty$, and for $1 \le \gamma < 2$ or $2j < \gamma < 2(j+1), j = 1,2,\cdots, x^{-\gamma}g(x) \in L(0,\pi) \iff \sum n^{\gamma-1} |b_n| < \infty$.

A similar theorem is proved for the case in which the coefficients are $a_n = \frac{2}{\pi} \int_0^{\pi} f(x) \cos nx \, dx$, with the change that now the log term appears for γ odd integer.

Then we show that if a sequence (b_n) , $n=1,2,\cdots$ is given and if $g(x)=\sum\limits_{1}^{\infty}b_n$ sin $n\,x$ converges, then under appropriate conditions on the coefficients b_n , for $\gamma=2\,j$, $j=1,2,\cdots,\,x^{\gamma-1}\,g(x)\,\epsilon\,L\,(0,\pi) \iff \sum n^{\gamma-1}\,(\log\,n)\,|\,b_n|<\infty$, and for $2\,j<\gamma<2\,(j+1),\,j=1,2,\cdots,\,x^{-\gamma}\,g(x)\,\epsilon\,L\,(0,\pi) \iff \sum n^{\gamma-1}\,|\,b_n|<\infty$.

A similar theorem exists for $f(x) = \frac{a_0}{2} + \sum_{1}^{\infty} a_n \cos n x$, also with the change that the log term appears for γ odd integer.

Then we prove a general integrability theorem for Laplace-Stieltjes transforms, and obtain as a corollary that if $f(x) = \sum_{0}^{\infty} c_n x^n$ has radius of convergence 1, then under appropriate conditions on the coefficients, for $\gamma \neq \text{integer} > 0$, $f(x) (1-x)^{-\gamma} \in L(0,\pi) \iff \sum n^{\gamma-1} |c_n| < \infty$, and for $\gamma = \text{integer} > 0$,

$$f(x) (1-x)^{-\gamma} \in L(0,\pi) \iff \sum n^{\gamma-1} (\log n) |c_n| < \infty$$
.

In the last two chapters we show that if we relax the conditions on the coefficients c_n , the " \Leftarrow " part of the power series theorem becomes an Abelian theorem, and the " \Longrightarrow " part becomes a Tauberian theorem.

Microfilm \$2.00; Xerox \$3.60. 63 pages.

CLEAVAGE OF INSEPARABLE FIELD PRODUCTS

(L. C. Card No. Mic 58-7578)

William Duane Montgomery, Ph.D. Iowa State College, 1958

Supervisor: Bernard Vinograde

The conditions for the cleavage of some special cases of direct product algebras are obtained. These algebras

are the direct product $L \times_K M$ of two field extensions L and M of K. The characteristic of K is a prime p, while L is a finite dimensional and pure inseparable extension of K.

Chapters I and II provide necessary background material as well as two theorems. The first theorem characterizes the intersection E of L and M in the unique composite L M, while the second theorem shows that the condition for cleavage is equivalent to finding an isomorphic image of the composite properly placed within the algebra. Chapter III considers some cases for K = E as well as giving a necessary and sufficient condition for L X_K M to be a field. Chapter IV considers the case of M as an inbetween field of L and K while Chapter V gives conditions for cleavage in the general case in terms of the multiplication tables of L over K and L M over M.

Chapter VI is entitled "External Criteria" and considers conditions for cleavage in terms of other properties of the algebra L X_K M itself. This is in contrast to the previous chapters which have given conditions for cleavage in terms of the fields L, M, and the composite L M. Microfilm \$2.00; Xerox \$3.00. 29 pages.

VIRTUAL MASS OF A DEFORMABLE BODY

(L. C. Card No. Mic 58-7567)

Wallace Albert Raab, Ph.D. Iowa State College, 1958

Supervisor: H. J. Weiss

The linear perturbation flow past an infinitely long deformable cylinder, for both compressible and incompressible fluids, was obtained by solving Laplace's equation in cylindrical coordinates. A solution was obtained which contains as a limiting case the Prandtl-Glauert correction factor for two-dimensional flow. To indicate the manner in which the transition to two-dimensional flow takes place, one specific case was plotted in the form of a graph. As the radius of the basic cylinder becomes large, it was shown that the perturbation velocity at the surface of the cylinder is of the same general form as the perturbation velocity along a wave-shaped wall.

This paper is particularly concerned with the calculation of the virtual mass of a vibrating ellipsoid. Since the virtual mass of a body moving in a fluid may be computed once the kinetic energy of the fluid is known, the kinetic energy for an ellipsoid vibrating in two and three nodes was determined. The kinetic energy of the fluid was compared with the kinetic energy of the ellipsoid itself. This ratio is always less than unity and was plotted versus the ratio of the semi-minor to the semi-major axis of the ellipsoid to indicate the manner in which the energy is reduced as compared with the two-dimensional case. It was shown that if a uniform flow is superimposed in the direction of the major axes of the ellipsoid, the positions of the nodes of vibration and the kinetic energy of the fluid are independent of this uniform flow.

Microfilm \$2.00; Xerox \$3.00. 58 pages.

EFFECT OF AN ELLIPTIC DISK OF ORTHOTROPIC MATERIAL ON THE STRESS DISTRIBUTION IN AN ORTHOTROPIC PLATE

(L. C. Card No. Mic 59-8)

Leonidas Howard Roberts, Ph.D. The University of Florida, 1958

Through the application of complex variables and mapping functions, expressions for stresses are found for the case of an infinite rectangular orthotropic plate with an elliptic disk of orthotropic material at its center. The major and minor axes of the elliptic disk, and the axes of elastic symmetry of the disk and the plate are all taken parallel to the coordinate axes which are centered in the disk. The edges of the plate lie parallel to the coordinate axes and a uniform tension is applied along two of the opposing edges. The general problem is then specialized to yield stresses when the disk is circular, or when it is of isotropic material (elliptic and circular), and finally, the problem is shown to reduce to the case of an elliptic (or circular) hole in an orthotropic plate.

Microfilm \$2.00; Xerox \$4.00. 75 pages.

TOPOLOGICAL DYNAMICS AND A PARTLY ORDERED SET OF TOPOLOGIES

(L. C. Card No. Mic 58-7593)

Herbert Ronald Rouse, Ph.D. Vanderbilt University, 1958

Supervisor: Professor L. T. Ratner

The set of all topologies on a set forms a partly ordered system with respect to the relation of refinement. This partly ordered system is a complete lattice.

A topological property is defined to be <u>ascending</u> provided every refinement of a topology having this property also has the property; <u>completely lattice ascending</u> provided the least upper bound of every set of topologies having the property also has it; and <u>lattice ascending</u> provided the least upper bound of any two <u>topologies</u> having the property also has it. Similar definitions are given for descending properties.

A number of properties are studied which satisfy these conditions. For example, if X is a set and t is a transformation of X into itself, then continuity of t is a completely

lattice ascending property.

The set of all uniform structures on a set also forms a partly ordered system with respect to the relation of uniform refinement. It is shown that every set of uniform structures has a uniform least upper bound, and that the uniform least upper bound of a set of uniform structures is a uniform basis for the least upper bound of the topologies they generate.

Let X be a topological space and let T be the set of continuous transformations of X into itself. A topology on T is admissible provided for every x in X, every t in T, and every neighborhood W of xt, there exist neighborhoods U of x and V of t such that $UV \subseteq W$. Admissibility is an ascending property. Using this fact, some theorems are

proved relating the properties of admissible topologies on T and properties of the topology on X.

Several specific topologies for T are discussed, uniform bases for them are exhibited, and their relative positions in the partly ordered set of topologies on T (and in the partly ordered set of uniform structures on T) are determined for various hypotheses about the topology on X. For example, if X is a normal Frechet space with a uniform structure which is the uniform least upper bound of all uniform bases for the topology on X, then the structure of uniform convergence [Bourbaki, Topologie Generale, Chapt. x, p. 5] on T is a uniform refinement of the finite covering structure [Krein, Mat. Sbornick N.S., 33(1953), p. 627].

Some topological properties in groups and semigroups are studied with respect to the partly ordered system of topologies on the basic set. For example, if S is a semigroup (group) then the set of all topologies on S with respect to which S is a topological semigroup (topological group) is a complete lattice in this partly ordered system.

These results are then applied to the transformation space T with composition as the semigroup operation, and with the various topologies on T previously discussed. A subset A of a semigroup S is defined to be left (right) quasi-normal provided $AS \subseteq SA$ ($SA \subseteq AS$). Factor semigroups of a semigroup by its left (right) quasi-normal subgroups are discussed, and are shown to be topological semigroups with respect to the natural topology.

Some results concerning "topological transformation groups" [Gottschalk and Hedlund, Topological Dynamics] are generalized to semigroups. For a set X and a transformation semigroup (group) S acting on X, dynamic properties are studied with respect to the partly ordered system of topologies on X, and also with respect to the partly ordered system of topologies on S. Generally both recursion properties and transitivity properties are found to be descending. Microfilm \$2.00; Xerox \$5.00. 98 pages.

ERROR STRUCTURES IN EXPERIMENTAL DESIGNS

(L. C. Card No. Mic 58-7583)

George Zyskind, Ph.D. Iowa State College, 1958

Supervisor: Oscar Kempthorne

The primary objective throughout the various parts of the thesis has been the general formulation of certain basic aspects of problems of experimental designs to which the application of variance analysis is appropriate.

The thesis begins with some consideration of the relationships of nestings and crossings. A method for expressing the typical response as a sum of uniquely defined and physically meaningful linear functions of partial means, called population components, is specified and a proof is given that for any given arbitrarily general type of population structure such decomposition is always identical. Balanced population structures are then defined and a number of general properties of such structures proved.

With balance, the notion of subscripts belonging to the rightmost bracket becomes an especially convenient one.

A subscript belongs to the rightmost bracket of a group of subscripts if no subscript of the group is nested in it. The special properties which these subscripts satisfy induce certain "nice" properties in the population components and hence ensure the possibility of construction of "complete" analysis of variance tables. Further, they are also at the root of the lack of correlation between induced sample means in the different types of population components when the actual experiment is carried out; and so they are instrumental in giving rise to simple forms of expected values of squares of sample means.

Balanced samples from balanced population structures are investigated. Results for expected values of squares of sample means are obtained in both the σ^2 and Σ forms. The Σ 's are special linear functions of σ^2 's, and are defined in terms of excess rightmost bracket letters of the σ^2 's. The finite population corrections in expectations of squares of sample means are induced only by the type of samples taken in the rightmost brackets of the various population components. The role of the Σ 's is that they formally and automatically remove all the finite population correction factors involved.

The above property of the Σ 's is retained when instead of pure sampling one considers actual experimental design situations, and hence the additional relationship of random

confounding. Thus, the Σ forms of expected values of squares of sample means are essentially invariant under a wide variety of experimental situations and in this sense the Σ 's may be said to form a "canonical" set of parameters.

With randomized experiments various types of relationships may exist between the sample and population sets of subscripts. The notion of ambivalence is introduced to characterize the various possibilities. It is shown that when the ambivalence relation is complete, simple and well defined Σ forms for the lines of the sample analysis of variance result. This is the case with the usual analyses of variance of various generalizations of the completely randomized, the randomized block, and the split plot designs.

Investigation of experimental situations in which the application of treatments is explicitly envisaged to be subject to error shows that here also under many circumstances the standard Σ forms for expected values of squares of sample means are retained. Hence, with complete ambivalence, i.e. proper sample notations, the expected values of mean squares of the sample analyses of variance have simple and easily specifiable Σ forms which follow immediately from the general development given in the thesis. Microfilm \$2.50; Xerox \$8.60. 190 pages.

MINERALOGY

SYNTHESIS OF EPISTILBITE AND ITS PHASE RELATIONSHIPS TO OTHER CALCIUM ZEOLITES

(L. C. Card No. Mic 58-2764)

Dean Alan Buckner, Ph.D. University of Utah, 1958

Chairman: L. B. Sand

A hydrothermal study of the zeolites in the system lime-alumina-silica-water has yielded data on some of the phase relationships among the zeolite minerals and other minerals in the system.

Epistilbite was successfully synthesized and the probable upper temperature stability limit (300°C at 15,000 psi) of epistilbite was determined. The pressure-temperature relationships of the new phase, CASH-I, in the system are described. CASH-I is a transient phase in the synthetic system from 300° to 500°C at 15,000 psi. Polymorphic transformations between stilbite and epistilbite and between clinoptilolite and mordenite are demonstrated.

Optical, x-ray diffraction, infrared absorption, and differential thermal analysis data on natural and synthetic epistilbite as well as for the new phase, CASH-I, are given. X-ray diffraction data for a second new phase, CASH-II, are presented. Microfilm \$2.00; Xerox \$3.00. 54 pages.

PYROPHYLLITE IN SHALES OF NORTH CENTRAL UTAH

(L. C. Card No. Mic 58-7945)

Arthur J. Ehlmann, Ph.D. University of Utah, 1958

Chairman: L. B. Sand

Examination of samples from various exposures in north central Utah has revealed an unusual association of disseminated pyrophyllite with clay minerals in apparently unmetamorphosed shales. The pyrophyllite occurs in widely separated locations in three stratigraphic units: the Manning Canyon formation (Mississippian-Pennsylvanian), the Great Blue formation (Mississippian), and the Big Cottonwood series (Precambrian). Associated clay minerals occurring with the pyrophyllite are illite, illitemontmorillonite mixed-layer clay, chlorite, kaolinite, and sericite.

Outcrops of the Manning Canyon formation in and near the Lake Mountains contain shales with higher pyrophyllite content than other outcrops of shale in the area studied. The pyrophyllite particles are relatively large and concentrate in the coarse size fractions of the shale, whereas, the other clay minerals are finer grained.

Several explanations of genesis are considered and the most acceptable hypothesis is that of hydrothermal alteration. It is hypothesized that magnesium, iron, and interlayer cations were removed from some of the original clay minerals, which, with the addition of silicon, formed pyrophyllite. Microfilm \$2.00; Xerox \$5.80. 116 pages.

DIVERTIMENTO FOR ORCHESTRA

(L. C. Card No. Mic 58-7679)

Grant Beglarian, A.Mus.D. University of Michigan, 1958

As the title indicates, this is a composition in which relatively simple musical materials, lively orchestration, and short movements create a quality of lightness and playfulness. The instrumentation is for pairs of woodwinds, four horns, two trumpets, two trombones, basstrombone, timpani, percussion, and strings. The duration of performance is about nineteen minutes.

The Divertimento consists of four movements: Allegro energico, Moderato, Adagio, and Finale-Vivace. The first movement is in G, the central tonality of the work, and it serves as a lively introduction. A march-like character prevails in the movement, and establishes the general nature of the Divertimento.

The second movement is in F and in a relatively slow three-four meter. Unlike the first movement in which a single character dominated, in this movement a melodic material, common to all other movements as well, is developed, given various characters, and eventually crystallized into a recognizable theme. This melodic material is first presented by the violoncellos and basses in the opening measures of the first movement. There, the material serves only as an accompaniment figure. In the second movement, however, this material assumes an important thematic role. Beginning with an expanded statement in the woodwinds, the material goes through various transformations and elaborations until it emerges toward the end of the movement as a clearly outlined and concise phrase.

The Adagio movement is in contrast to the preceding Moderato not only in mood and tonality (A), but also in the manner in which the central thematic material is used. The concise phrase which ended the previous movement is now inverted and stated first by the first violins in a melody-and-accompaniment texture. The simplicity of this beginning statement gradually gives way to more complex textures in which melodic lines overlap and later are broken up into characteristic intervals and figurations. The movement ends with fragments from the central melodic material.

In the concluding Vivace movement the central melodic material is condensed still further into two interlocking intervals of fourths. The movement has a typical finale character of the traditional symphony. The Finale is in three parts in which the outer sections are in a gigue-like character, in contrast to the inner part which is more complex in meter and is melodically more sustained. The expressive climax of the Divertimento is reached in the middle of this movement where divided violins and violas play long notes in high register. The passage is extremely soft and is the only one in the piece in which the texture is free of rhythmic counterpoint. The movement ends with a brilliant coda.

The Divertimento is in the tradition of early symphonies, in which humor, clarity, and subtlety merge to create a satisfying musical entity.

Microfilm \$2.00; Xerox \$5.80. 118 pages.

AN ACOUSTICAL INVESTIGATION OF CERTAIN ASPECTS OF THE HOLTKAMP ORGAN IN CROUSE COLLEGE AUDITORIUM, SYRACUSE UNIVERSITY

(Publication No. 19,381)

David Nathaniel Marion Johnson, Ph.D. Syracuse University, 1956

Among contemporary organ builders, one of the most influential is Walter Holtkamp, of Cleveland, Ohio. His admirers identify him closely with the historical movement in music known as the "Baroque Revival." Since this Revival trend is the subject of many a heated controversy in musical journals at the present time, it is only fitting that a close examination of this man, through his work, take place.

However, one difficulty encountered so far has been the highly subjective nature of the debates and discussions centering in Holtkamp. The writer, feeling that an objective approach to the subject would be valuable and pertinent, has limited this study primarily to an acoustical analysis of certain aspects of the Holtkamp organ. It was felt that an acoustical approach, based on the findings of measuring instruments and interpreted, in the main, objectively, would permit definitive conclusions to be drawn.

Furthermore the study was limited to only one instrument, in order that maximum time could be spent in a more intensive investigation of its characteristics. The instrument chosen for this examination was the Crouse College Auditorium organ of Syracuse University; this particular instrument has drawn widespread attention and is generally well-known among professionals in the field.

One concluding aspect of the study was an endeavor to relate the Baroque Revival movement in organ design to the specific instrument under examination. Basic characteristics of Baroque organs were defined from the literature; conclusions were then derived from the application of these pre-defined characteristics to corresponding areas in the specific instrument.

Introductory chapters of the study presented the specifications of the instrument, its physical appearance, and tonal analyses of the choruses and other entities found on the different divisions.

The actual acoustical examination of the instrument was limited to certain aspects of four specific areas: harmonic spectra, initial transients, intensities, and effects of the Swell shades. One chapter was devoted to each of these areas.

The chapter on harmonic spectra discussed the

significance and importance of the overtone structure of organ pipes, and presented spectrograms of a representative pipe of each rank on the instrument. Spectrograms showing overtone structure as a function of pitch were also included.

The chapter devoted to initial transients (frequently referred to as "chiff" or "chirp," or "spinach") discussed the manner in which the sound of an organ pipe begins. The general aesthetic effects of initial transients were discussed, and oscillogram photographs of the appearance of characteristic wave-forms were presented.

The subjectivity of loudness was discussed in the chapter on intensities. For purposes of comparison and evaluation, charts indicating decibel ratings of the different ranks on the instrument at various pertinent pitches were presented.

The effects of the Swell shades upon overtone structure and intensities were next considered. Spectrograms and charts were used to demonstrate their effects.

Next a brief historical survey of organ design through the Baroque Period was presented, together with salient points in what is generally called the Baroque Revival movement.

Following this historical résumé, general characteristics of organs of the Baroque Period were presented. There were found to be fourteen such characteristics.

In conclusion, the study applied these characteristics to the instrument under investigation and, after defining and clarifying terms, found it to be a representative example of the Baroque Revival movement.

Microfilm \$3.00; Xerox \$10.40. 231 pages. Mic 59-934.

VOLUME I: THE REQUIEM MASS FROM ITS PLAINSONG BEGINNINGS TO 1600. VOLUME II: SELECTED REQUIEM MASSES

(L. C. Card No. Mic 58-5993)

Harold T. Luce, Ph.D. The Florida State University, 1958

The solemn and moving text of the Mass for the Dead has been a source of inspiration to composers of all ages. However, in spite of the many beautiful settings of the Requiem text, of which there have been more than a thousand since the advent of polyphonic music, a comprehensive study of this genre of musical composition has not yet been made. The lack of a detailed discussion of the earliest period of its development is particularly apparent.

From the period delimited by the dates 1475 to 1600, there remain some thirty-nine extant polyphonic Requiem Masses among whose composers are numbered many of the most illustrious masters of the Renaissance. Each of these works is manifestly distinct, exhibiting individual characteristics that stem from differences in style, differences in chronological association, and differences in national environment. With all their divergent aspects, however, there is yet in these works an underlying unity of spirit achieved by no other single type of Renaissance composition. The serious purpose which occasioned these Masses called forth from the composer a special effort to achieve an expression which would be altogether appropriate and at the same time artistically excellent.

The importance of the plainsong Missa pro defunctis to the polyphonic Requiem is attested by the fact that all of the known Renaissance works of this type employ as cantus firmi the appropriate plainsong melodies. The first chapter of the present study is devoted to a chronological accounting of the development of the plainsong Requiem from its earliest beginnings up to 1600. The chants for the Requiem from a representative group of early Graduals have been collated and their differences and similarities tabulated. Comparisons have also been drawn between various early versions of particular chants and their modern counterparts.

A discussion of the composers of Renaissance Requiems and of their works is given in the second chapter which also includes a brief biographical statement for the little known composers. Conclusions regarding the typical treatment of the various items of the Requiem are presented in the second portion of the chapter.

Subsequent chapters are concerned with a discussion of individual works.

Volume II includes nine complete Renaissance Requiems, most of which have not appeared previously in modern editions. Composers represented are Antoine Brumel, Claudin de Sermisy, Pierre Certon, Pierre Clereau, Jacob Vaet, Francisco Guerrero, Orlandus Lassus, Giovanni Matteo Asola, and Giulio Belli. A portion of Johannes Prioris' Requiem is also included. The choice of these composers' works has been based upon the attempt to provide examples which reveal the development of the Requiem Mass throughout the sixteenth century and which represent significant additions to the repertoire of the modern concert choir.

It is hoped that, through this effort, present-day audiences can appreciate more fully than was heretofore possible, the profound grandeur and classic beauty of the Renaissance Requiem.

Microfilm \$8.95; Xerox \$31.90. 708 pages.

HANDEL AS AN OPERA COMPOSER

(L. C. Card No. Mic 58-2779)

Sirvart Poladian, Ph.D. Cornell University, 1946

The objective of this dissertation is to present the characteristics of the music in Handel's operas, and to determine the place this music holds in the history of opera.

An introductory chapter provides the historical perspective, beginning with the origin of opera in the Florentine camerata and following its course up to the time of Handel. The development of the formal elements in opera—the overture, recitative, aria, chorus, ensemble, and instrumental numbers—is traced by examining approximately two-hundred opera scores, including works by Peri, Caccini, Cavalli, Cesti, Steffani, Stradella, Scarlatti and other composers of the Venetian and Neapolitan schools.

All important musical aspects of Handel's operas are discussed, based upon a detailed analytical study of these works as they appear in Händel's Werke, published by the Deutsche Händelgesellschaft.

The analysis of Handel's musical style and treatment, viewed in historical perspective, reveals his contribution to the evolution of operatic form.

The examination of Handel's librettos and librettists discloses the changes or improvements the latter (or Handel) introduced, the role Apostolo Zeno and Pietro Metastasio played in formulating the literary style of opera librettos.

Handel's setting of the secco recitative—the curtail—ment of nonessentials in the libretto, concentration towards a more dramatic expression, the character of the vocal line as an expression of dramatic situations, and the function of harmonic devices at dramatic points are discussed at length. One of Handel's major contributions to opera, the accompanied recitative, widely acclaimed by his con-

temporaries, is fully illustrated.

Handel's prolific melodic invention (approximately 1100 opera arias) finds embodiment in various types, the cavatina and the arioso, arias in stylized dance forms such as the siciliano and the saraband, the minuet and the jig. Each one of these characterizes a different sentiment, each conveys a definite emotional state. The association of various rhythmic-melodic musical patterns and tempi with certain moods reflects the influence of Affektenlehre which pervaded the aesthetics of the eighteenth century. Examples of each type and category, love and hate, hope and despair, scorn and anger, lust and joy are enumerated.

Not only the musical ideas but instruments chosen to accompany specific arias likewise play an important part in the characterization of personages and of situations in

the oneras

In accompaniments consisting of small instrumental ensembles Handel reached the very height of accompanied song of his time, and his polyphonic settings aroused the envy of his contemporaries. For its period, the wide range of musical ideas, from imitative ritornelli to symphonic motives demonstrates Handel's ingenuity.

The available contemporary information concerning the opera orchestra of the eighteenth century, its size, instruments employed, the purpose as well as the nature of the musical material, and the use of the double orchestra is presented. The movements of the overture and of other

instrumental pieces are analyzed.

A comparison of eight Handel operas with settings of the same text by his contemporaries confirms further the contributions Handel made to the enrichment of the form, particularly in his accompanied recitatives, in his bravura arias, and in his instrumental scoring.

Throughout the discussion, copious comments and criticism by Handel's contemporaries and other writers of the eighteenth century supplement analytical data. Numerous musical excerpts illustrate the points under discussion.

The chapter on the twentieth century revivals of Handel's operas contains suggestions derived from Handel's revision of his own works, lessons learned from a survey of recent performances, and the various methods employed in adapting these Baroque operas to twentieth century audiences.

The innate vitality of this music and its appeal to present day audiences is revealed by the total of 585 performances between the years 1920 and 1927.

The dissertation closes with an extensive bibliography on Handel and on opera in general.

Microfilm \$6.00; Xerox \$21.40. 472 pages.

THE SACRED ORATORIOS OF
GEORG PHILIPP TELEMANN (1681-1767).
VOLUME I: AN HISTORICAL AND STYLISTIC SURVEY.
VOLUME II: A SELECTED ANTHOLOGY OF MUSIC

(L. C. Card No. Mic 58-5995)

Claude H. Rhea, Jr., Ed.D. The Florida State University, 1958

The more than thirty oratorios composed by Georg Philipp Telemann (1681-1767) form one of the most impressive single bodies of literature of this type to be found in the early eighteenth century. Unfortunately, only seven of these oratorios now appear to be extant: Jauchze, jubiliret (1730), St. Nicholai Kirchen Oratorio (1739), Danket den Herrn (1755), Herr du bist gerichts (1762), Der Tag des Gerichts (1762), and Oratorium zum Reformationsfeste (n.d.). With the exception of Der Tag des Gerichts, none of these works, in so far as can be determined, have been edited or performed since the composer's death.

The dual purpose of the present study is to analyze the style of the vocal works of Telemann against a background of the history of the period and to prepare performing editions of selected compositions from the oratorios. Chapter One traces the evolution of the oratorio from its beginnings to 1800. Chapter Two is a biographical study of Telemann based upon original documents. Chapter Three is devoted to an examination of Telemann's musical style as revealed in his oratorios.

Telemann utilizes well-balanced combinations of choruses, secco and accompagnato recitatives, and da capo arias as a means of achieving variety and to effect a lucid plan of unification. The oratorios fall into three distinct groups: (1) a continuous one movement plan, (2) a work divided into two large parts, and (3) a work divided into four shorter sections.

Like other composers of the Aufklärung, Telemann held to the belief that music should be the property of the common man and as such should present few complex problems of performance. The music of his oratorios is simple, direct and functional. Cantabile melodies are predominant, and conservative harmonic textures are employed. Telemann's vocal style is largely influenced by the Neapolitan opera bel canto writing. He frequently uses rhythmical and motivic devices to enhance the dramatic content of the text.

The texts of Telemann's oratorios are basically "free," i.e., they are rhymed poetic verses which paraphrase scriptural passages or are original libretti written for specific works. Like other of his early and late contemporaries, Telemann's textual settings are patterned on German speech rhythms. He attempted to achieve a union of words and music, capturing the inherently expressive values of speech in musical sound. The oratorio texts are from four sources: (1) The Old Testament, (2) The New Testament, (3) Chorales from Lutheran hymnody, and (4) "Free" texts.

The first volume is appended with an English translation of Telemann's autobiography as found in Johann Mattheson's Grundlage Einer Ehren-Pforte (1740) and a table of contents for Telemann's seven extant oratorios.

The second volume comprises a selected anthology of compositions from Telemann's oratorios transcribed for modern performance. The St. Nicholai Kirchen Oratorio, scored for: Three trumpets, fagott, oboe, tympani, strings,

continuo; soprano, alto, tenor and bass soloists; and mixed chorus, is edited in its entirety. Representative selections from other extant oratorios, both solo and choral literature, are also included.

Microfilm \$5.20; Xerox \$18.60. 406 pages.

LEICHTENTRITT'S "HISTORY OF THE MOTET": A STUDY AND TRANSLATION (CHAPTERS 7-15)

(L. C. Card No. Mic 58-2777)

John Eugene Seaich, Ph.D. University of Utah, 1958

Chairman: David Shand

When the great German musicologist, Hugo Leichtentritt, died in Cambridge, Massachusetts in 1951, he left behind him, in addition to his numerous published works, the partially completed manuscript translation into English of his classic treatment of the motet, Geschichte der Motette. This work, published in German in 1908, has remained the standard history of the subject, referred to in the latest edition of Grove's Dictionary (fifth edition, 1955) as the only major book to cover the entire field. Apel's Harvard Dictionary of Music (1951) likewise accords it the honor of being the sole and chief history of the whole subject, since the numerous other works referred to only treat special phases of the motet.

In order to make such an important work available to the English-speaking world, it has been felt necessary to take up the task of translation where the author left off, so that both parts, representing the whole of the original German edition, might be eventually presented to the public.

Leichtentritt's own manuscript of the first six chapters (now somewhat enlarged by himself) is in the possession of Dr. Leroy Robertson, the well known American composer, and present head of the music department at Utah. It was given to him, for the University, by Leichtentritt's sister, shortly before her own death, in hope that it might find its way into publication. An earlier attempt to print it had failed, since the work was somewhat less than half-complete, and in need of further translation.

It is now hoped that the contents of Leichtentritt's classic work will be accessable to a larger circle than ever before. Copies of the original book are exceedingly scarce, and necessarily reserved for only those who read German. It included the whole history of the motet form, from its beginning to modern times. The present translation begins with the Venetian motet, and continues with the concertato motet and monody, the entire history of the German motet, the Spanish motet, the French motet, the English motet, and ends with a consideration of the form after Bach. There is appended a condensation and outline of the entire work; also included are numerous and lengthy musical examples which will give the student a living picture of this immense and important form.

Microfilm \$4.25; Xerox \$14.40. 331 pages.

THE EFFECT OF PRE-BAND MELODY AND RHYTHM INSTRUMENTS ON THE MUSICAL LEARNING OF BEGINNING FOURTH GRADE INSTRUMENTAL STUDENTS

(L. C. Card No. Mic 58-5868)

William B. Tietze, Ph.D. State University of Iowa, 1958

Chairman: Associate Professor Neal E. Glenn

This study has been concerned with finding a more effective way of teaching instrumental music to young students. This is not a new problem in education, for there has accumulated a great amount of literature about instrumental music instruction at the elementary level. This literature and research have, however, been of little benefit to the instrumental teacher.

Specifically, this study was concerned with a very small aspect of teaching instrumental music to young children. The problem was: What is the effect of pre-band melody and rhythm instruments on the musical learning of beginning fourth grade instrumental students? Musical learning was defined as the proficiency in playing the instrument, and knowledge of basic music theory, which included music reading, symbols, and terminology.

The method used in this study was experimental. The Control and the Experimental Groups were made up from the entire fourth grade class at the University Elementary School during the school year 1957-58. The Control Group were taught as they had been in the past, and the Experimental Group utilized pre-band instrumental training by: (1) playing rhythmical exercises on practice pads with drum sticks for a four week period (2) playing on flutophones for a three week period (3) playing regular band instruments for the remaining eleven weeks, employing the full band method procedure.

The relative effectiveness of these two methods was determined by comparing the gains made on not only the Kwalwasser-Ruch Test of Musical Accomplishment but also on the Practical Playing Test that was especially devised for this study.

The specific questions with which this study was concerned are the following:

- 1. Is there any significant value in teaching beginning instrumental music students the individual components of music, rhythm, note and rest values before starting them on band instruments?
- 2. Does the carry-over of musical knowledge acquired in pre-band instrument classes warrant the time spent on pre-band instruments?
- 3. Will this proposed method improve interests and attitudes of the pupils in instrumental music?

Within the limitations of this investigation the following conclusions seem warranted:

- 1. The procedure followed in the Experimental Group proved superior in all cases.
- 2. There was a significant gain made by each group in the Kwalwasser-Ruch Test of Musical Accomplishment. This gain was significant at the 5 per cent level of confidence, which indicates that both methods were effective within themselves. However, the Experimental Group's

T-Test score of 4.85, was almost twice as significant as the score of the Control Group of 2.918.

3. The Experimental Group was superior in the Practical Playing Test even though they had played on band instruments seven less weeks than did the Control Group. This difference, however, was not statistically significant at the 5 per cent level of confidence.

4. The basic foundation laid in teaching the individual components of music through pre-band instruments in the Experimental Group proved advantageous from the stand-

point of the pupil and the teacher.

5. Attitudes and interests of the Experimental Group remained consistently commendable during the experimental period, while those in the Control Group at times bordered on boredom.

Microfilm \$2.00; Xerox \$5.40. 108 pages.

THE SACRED CANTATAS OF PHILLIP HEINRICH ERLEBACH (1657-1714)

(L. C. Card No. Mic 58-5973)

Edgar vom Lehn, Ph.D. The University of North Carolina, 1958

Supervisor: Glen Haydon

This dissertation is a stylistic study of the twenty-three extant examples of Erlebach's sacred cantatas. The composer is an important figure in the history of the <u>Lied</u> in Germany as well as one of the significant men concerned with the developing cantata form of the Baroque. None of the cantatas published during the composer's lifetime have survived to the present day. Although a few other works by the composer in the vocal and instrumental field have been published, the cantatas have remained in MS in German libraries.

The dissertation is divided into five chapters in which the following material is presented: (I) a discussion of the cantatas and their relationship to the composer's total musical product; (II) a biography which considers the increasing respect for the composer by scholars as more of his works are made available for examination; (III) a description of the MS sources in which are included several facsimile pages; (IV) a stylistic analysis; (V) conclusions relevant to the cantatas themselves and the composer in general

The study was undertaken in the belief that much of the composer's music in the sacred field would find a place in the repertory of present day choral groups if it were made available. Transcriptions from the MSS comprise some six hundred pages of music. In lieu of presenting such a large body of material within the thesis, a detailed thematic index was prepared and included as an appendix. It is concluded that Erlebach was one of the great transitional figures in the German sacred cantata. He is perhaps the outstanding German musician in the period between Heinrich Schütz and Johann Sebastian Bach.

Microfilm \$3.00; Xerox \$10.20. 230 pages.

FLORENTINE COMIC OPERAS OF THE SEVENTEENTH CENTURY

(L. C. Card No. Mic 58-5975)

Robert Lamar Weaver, Ph.D. The University of North Carolina, 1958

Supervisor: Glen Haydon

The goal is to trace the history and effect of the comic operas produced in Florence in the seventeenth century, of which the first is the well-known Potestà di Colognole with libretto by Giovanni Andrea Moniglia and music by Jacopo Melani. However, the subsequent comic operas of the same type are not known.

The research is largely based upon the original sources of music manuscripts and published librettos of the seventeenth century. It also includes a search through catalogues of manuscripts and librettos, dictionaries, and other secondary sources, which are not organized so as to yield easily available information about the specific subject of the dissertation.

The results show an activity in operatic productions of all types in Florence greater than hitherto had been suspected and in particular a continuity of comic operas that is sufficient to establish a "school of Florentine comic opera" where previously only isolated examples had been recognized. Microfilm \$4.85; Xerox \$16.20. 379 pages.

THE CONCERTED SYMPHONIES OF
JOHN CHRISTIAN BACH:
VOLUME I: ANALYTICAL STUDY OF
FIRST MOVEMENTS
VOLUME II: THREE SYMPHONIES IN SCORE
[Edited by Joseph A. White, Jr.]

(L. C. Card No. Mic 58-3750)

Joseph Addison White, Jr., Ph.D. University of Michigan, 1958

John Christian Bach undoubtedly attained greater fame in his day than did any other of Bach's sons. An accomplished composer and expert performer, music-master to Queen Charlotte, and co-founder of the famous series of concerts known as the Bach-Abel Concerts, he was held in high esteem throughout the musical salons of England and the Continent. Bach's pen was drawn to every form of musical composition popular during his generation. His vocal music embraces works of secular as well as of sacred nature and includes Operas, English Comedies and Cantatas, Italian Cantatas and Arias, English Songs, Vocal Duets, and numerous works suitable for church use. His instrumental music, by which he was and still is chiefly known, consists of Symphonies, Overtures, Concertos, Sonatas for piano and violin, Duets for violin, and Sonatas for pianoforte. To these may be added a number of Military Marches.

Until comparatively recent times, Bach has been treated by scholars with singular neglect. Indeed, not until 1929, with publication of Terry's John Christian Bach, were the full circumstances of his life brought to first light. The same is true of Bach's music, but to a lesser extent. MUSIC 2105

Studies by Schwarz, Schökel, and Tutenberg have contributed toward a more just appreciation of Bach's genius as an instrumental composer. These studies have been supplemented by a generous number of modern editions. In these contributions, however, Bach's Concertos for groups of solo instruments or Concerted Symphonies, as they have here been called, have received but little attention. The purpose of the present study, then, is to make an inquiry into these works and to present an edition of three complete symphonies in score, thereby reintroducing this valuable body of musical literature and, in so doing, providing for greater understanding of one phase in the development of the form of the concerto in the eighteenth century.

The study is presented in two volumes. The first contains an account of the biographical material concerning Bach contributed by various scholars together with a listing of his compositions now available in modern edition, an examination of Bach's Symphonies and Concertos for single solo instruments as well as his Concertos for groups of solo instruments, and a detailed discussion of the structural framework of the first movement of the Concerted Symphony. This movement was selected for special emphasis partly because of its greater importance to the work as a whole and partly because in it the aspects of the symphony and of the concerto which are brought together to create the Concerted Symphony are shown in clearest detail. The concluding remarks in Volume I provide a summary of the important stylistic characteristics revealed in the main body of discussion. An Appendix supplies a thematic index to the entire group of works.

Volume II contains three symphonies in score and a critical commentary. The works included are the Concerted Symphony in E^b Major for two violins, two violas, two oboes, two horns, and violoncello, the Concerted Symphony in G Major for two violins and violoncello, and the Concerted Symphony in E^b Major for two clarinets and bassoon, all with orchestral accompaniment. The selection of these works for publication has been made not only on the basis of their intrinsic musical value and their variety in concerted instrumental groups, but also because they seem best to complement the two symphonies already edited by Alfred Einstein and Fritz Stein. Microfilm \$7.30; Xerox \$25.60. 576 pages.

LITURGICAL MUSIC ARRANGED TO MEET THE NEEDS OF GRADES VII, VIII, AND IX SINGING GROUPS IN CATHOLIC PAROCHIAL SCHOOLS OF FLORIDA. (PARTS I AND II)

(L. C. Card No. Mic 58-5999)

Joseph Lawrence Zingale, Ph.D. The Florida State University, 1958

In the past twenty-five years or more an increasing interest has been developing in various aspects of music in the public schools of the United States. One area which has received attention due to its unique problems has been that of the junior high school, particularly with reference to the vocal achievements of boys passing through the voice change. There has been considerable research involving the music achievements of young adolescents in public schools and Protestant Church choral music, but as yet there is little evidence of parallel research concerning Catholic Parochial Schools.

The purposes of this study were, (1) to procure and assemble data concerning music programs in grades VII, VIII, and IX of Catholic Parochial Schools in Florida, (2) to appraise this data and isolate specific problems, (3) to suggest solutions to some of these problems on the basis of remedial measures proposed in previous dissertations and by authorities in the field of public school music and Baptist Church music, and (4) to compile and arrange selections from Catholic liturgical music for performance by young people passing through early adolescence. Information was sought for item (1) by means of a questionnaire instrument.

A summary of the questionnaire survey revealed that 87.8 per cent of the seventy-four questionnaires were returned. An appraisal of these returns indicated many problems. Three of these were identified as being the possible roots of difficulties experienced by choirs of young adolescents: (a) lack of uniformly acceptable criteria concerning the scope and limitations of children's voices in grades VII, VIII, and IX, (b) lack of understanding the nature and function of the boy's changing and early changed voice, and (c) lack of liturgical materials designed to meet the needs of the children in parochial school and church singing.

Results obtained indicate that directors of grades VII, VIII, and IX singing programs in Catholic Parochial Schools of Florida should become aware of recent research concerning the boy's changing and changed voice as a partial solution to vocal problems faced by these groups. Findings of research identified as the cambiata concept of the boy's changing voice are recommended for study. In addition, it was recommended that publishers of Catholic Church music be made aware of the need for a new type of liturgical music arranged to meet the needs of voices of young adolescents.

The final phase of this study dealt with the dearth of liturgical materials compatible with vocal ranges and performance skills of children passing through early adolescence. Some of the most frequently used Catholic liturgical selections were arranged according to the criteria set forth by Irvin Cooper in the cambiata concept of the boy's changing voice. While this may not completely solve the problem, it is suggested that these arrangements point the way to the establishment of an improved type of liturgical choral literature.

Microfilm \$2.75; Xerox \$9.40. 210 pages.

PHARMACOLOGY

THE SOLUBILITY OF POLAR SOLUTES IN MIXED SOLVENTS

(L. C. Card No. Mic 58-7967)

Marvin Joseph Chertkoff, Ph.D. Purdue University, 1958

Major Professor: Dr. A. N. Martin

The solubility of benzoic acid, alpha-naphthol, beta-naphthol, phthalimide, and N-methylphthalimide was determined in mixtures of hexane and ethyl acetate at 25°. The change in solubility of these solids on addition of ethyl acetate was proportional to the ester concentration raised to an exponential power. For benzoic acid the exponential was a constant to 60 per cent by volume of ethyl acetate, for beta-naphthol to 50 per cent, and for phthalimide and N-methylphthalimide to 100 per cent. In the case of alphanaphthol the exponential constantly decreased with change in ethyl acetate concentration. No relationship was observed between the pK's of the solutes and the exponential value or the proportionality constant for the equation which expressed the linear areas.

Using the Hildebrand formulation for regular solutions, the theoretical mole fraction solubilities at 25° of benzoic acid in mixtures of hexane and ethyl acetate, ethyl acetate and ethyl alcohol, hexane and ethyl alcohol, and ethyl alcohol and water were calculated and compared with experimental results.

From 50 per cent by volume of ethyl alcohol in ethyl acetate to 100 per cent ethyl alcohol, excellent agreement was obtained between calculated and observed values. The maximum solubility occurred at essentially the same solubility parameter value, and the mole fractions dissolved were approximately equal.

In the system hexane-ethyl alcohol, the observed solubility of benzoic acid was higher than that predicted by the theory to 50 per cent by volume of ethyl alcohol, and lower than the calculated value to 100 per cent ethyl acetate concentration. In the other systems, the observed values were all greater than the theoretical values.

Microfilm \$2.00; Xerox \$4.20. 76 pages.

A STUDY OF PARTICLE SIZE AND SURFACE AREA ANALYSES

(L. C. Card No. Mic 58-7974)

William Hersh Golod, Ph.D. Purdue University, 1958

Major Professor: Dr. A. N. Martin

Previous work has shown that the physical and chemical characteristics of industrially important powders, as

well as the quantities involved, vary widely. In consequence of these wide differences in characteristics and in the quantity of the powder involved, numerous techniques for the measurement of size characteristics of powders have been developed, but most of the techniques are unsatisfactory in some respect, and it is certainly true that there is no general method of particle size determination which may be applied with even reasonable confidence to a wide range of materials.

The primary objective of this work was to construct, calibrate, and standardize the procedure of operation for the modified Brunauer, Emmett and Teller (B.E.T.) apparatus and electro-magnetically compensated microbalance. A secondary objective was the measurement of the particle size or surface area of twenty-four powders and granules by the above two methods, air-permeability, sieve, Andreasen pipette, adhesive film, and microscopic methods, and to correlate the results obtained.

After the necessary calibrations were made for each instrument, the surface area or particle diameter of the various powders and granules was determined. Due to the inherent limitations of each instrument, it was impossible to measure the entire particle size range by any given method. Those particles that could be measured were used as a means of correlating the results obtained by the various methods.

Intercomparison of the results of the sieve and microscopic methods of analysis indicates that within the range of 50 to 100 microns good agreement could be obtained. Powders or granules whose diameter was either above or below this region gave results which differed greatly.

Intercomparison of the Air-Permeability and Andreasen pipette methods of analysis indicated that in the range of 20 to 75 microns, fair agreement could be obtained. At diameters higher than 75 microns, however, the Air-Permeability results became quite inconsistent, whereas the Andreasen pipette results were found to closely agree with the microscopic measurements up to 100 microns.

The adhesive surface method was found to compare favorably with the Air-Permeability method in the range of 0.1 to 20 microns. From 20 to 60 microns the results of the surface adhesion method compared more favorably with the microscopic method of analysis.

Excellent agreement, for the direct measurement of surface area, was obtained between the B.E.T. and electromagnetic balance. However, conversion of these values to the mean surface volume diameter (d_{vs}) produced results which varied greatly from those values obtained by the microscopic measurement of d_{vs} .

Microfilm \$2.30; Xerox \$8.00. 173 pages.

EFFECT OF CERTAIN CARBOHYDRATE METABOLITES ON MORPHINE ANALGESIA

(L. C. Card No. Mic 58-7979)

Hideko Katayama, Ph.D. Purdue University, 1958

Major Professor: Dr. T. S. Miya

Both glucose and insulin have been shown to potentiate morphine analgesia in our laboratory. This study was an attempt to elucidate the mechanism of this potentiation. Glucose-1-phosphate, fructose-1,6-diphosphate, and the acids of oxaloacetic, succinic, alpha-ketoglutaric, pyruvic, and lactic were tested on rats for their ability to increase morphine reaction threshold by the D'Amour Smith method (J. Pharmacol. Exptl. Therap., 72:74, 1941). Doses ranging from 10 to 50 mg./Kg. were administered intraperitoneally with 10 mg./Kg. of morphine sulfate. Lactic, pyruvic, oxaloacetic, and alpha-ketoglutaric acids significantly increased the morphine reaction threshold, while succinic acid and the phosphorylated compounds did not. With the exception of alpha-ketoglutaric acid, the carbohydrate metabolites alone increased the normal reaction threshold slightly. There was no correlation between blood glucose levels and the degree of analgesia. Since the acids of the carbohydrate metabolites were of low pH, hydrochloric acid of comparable pH and volume was also studied. The irritation produced by the acid did not alter the morphine reaction threshold significantly. The possible mechanism of the morphine reaction threshold potentiation is discussed. Microfilm \$2.00; Xerox \$4.80. 93 pages.

HEPATIC ENZYMES OF HEXOSE METABOLISM

(L. C. Card No. Mic 59-722)

William Frederick Perske, Ph.D. The University of Wisconsin, 1959

Supervisor: Associate Professor Robert E. Parks, Jr.

The following five studies are described in this thesis: interrelationships of hepatic enzymes of hexose metabolism in normal animals, changes produced in hepatic hexose metabolism by the diabetic and hypophysectomized states, hepatic phosphorylase and epinephrine hyperglycemia, hypoglycin A and hepatic hexose metabolism, and metabolic differences between hepatic parenchymal cells and a cultured cell line from the liver.

1. Interrelationships of Hepatic Enzymes of Hexose Metabolism in Normal Animals. Many investigators have studied the activities of enzymes involved in hepatic glucose synthesis and breakdown. However, the majority of these studies were restricted to one or two individual enzymes and only limited attempts were made to examine the interrelationships of these enzymes. Because of the strategic position occupied by glucose-6-phosphate in hepatic hexose metabolism the interrelationships of the enzymes involved in the formation and breakdown of this compound were studied.

Preliminary studies of some of the individual enzymes

were performed prior to studying their interrelationships. In accordance with deDuve's observation glucose-6-phosphatase was found confined to the microsomal components of the hepatic cell. Marked increases in the activity of this enzyme were observed after incubation at alkaline pHs indicating an unmasking of an inactive form.

The enzymes studied and their activities, expressed in micromoles of substrate reacting per minute per gram wet weight of liver at 30°, were: glucose-6-phosphatase, 6.5; fructose-1,6-diphosphatase, 5.0; phosphorylase (towards glucose-1-phosphate), 4.4; phosphorylase (towards glycogen), 12.3; fructokinase, 4.5; glucose-6-phosphate dehydrogenase, 1.1; and 6-phosphogluconic dehydrogenase, 2.6.

Similar patterns of activities were noted in dogs, cats, and rabbits.

This data reveals a similar pattern of activities of the enzymes of hexose metabolism in the species studied. These activities represent the maximal rates attained under optimal conditions and offer little information on the actual velocities in vivo. However, it seems more than coincidence that these maximal activities are of a similar order of magnitude, particularly those enzymes which function in the direction of glucose formation.

2. Changes Produced in Hepatic Hexose Metabolism by the Diabetic and Hypophysectomized States. In the livers of alloxan diabetic rats glucose-6-phosphatase and fructose-1,6-diphosphatase activities were found to be markedly elevated while glucose-6-phosphate dehydrogenase activity was depressed. The activities of the other enzymes showed no changes.

A marked depression in glucose-6-phosphate dehydrogenase activity was observed in hypophysectomized rats while the other enzymes studied displayed activities within the normal range.

3. Hepatic Phosphorylase and Epinephrine Hyperglycemia. In the early phases of this study it was noted that phosphorylase in the direction of glucose-1-phosphate had an activity approximating that of glucose-6-phosphatase. Also, hepatic phosphorylase was a readily reversible enzyme and its maximal activity in the direction of glycogen was three times greater than that in the direction of glucose-1-phosphate. These factors seriously challenged the concept put forward by Sutherland et al. that the hyperglycemic action of epinephrine was due to phosphorylase activation.

In the studies reported in this section of the thesis no alterations in the activity of phosphorylase were detected when hyperglycemia was prevented by the administration of dihydroergotamine or produced by injection of epinephrine. These findings suggested that epinephrine administration must bring about, in addition to phosphorylase activation, events which alter the equilibrium conditions to those favoring glucose formation or which activate an alternative pathway for glycogen breakdown.

4. Hypoglycin A and Hepatic Hexose Metabolism. Recently an amino acid called hypoglycin A was isolated from the fruit of Blighia sapida and found to be responsible for the severe hypoglycemia observed after injection of the unripe fruit. Chen has presented evidence which indicates that the site of action of this compound is the liver.

The influence of hypoglycin A on the activities of the hepatic enzymes reported upon in this thesis was studied

and no significant differences from the activities of these enzymes in normal rats were found.

5. Metabolic Differences Between Hepatic Parenchymal Cells and a Cultured Cell Line From the Liver. The Chang liver cell line (human liver) was studied to ascertain if it possessed the enzymatic pattern unique for liver. Glucose-6-phosphatase and fructose-1,6-diphosphatase activities were not detected. These enzymes are absent from most tissues except liver so these results indicate that these cells do not behave as true liver cells, and indicate a severe limitation in the use of these cells for many types of investigations. Microfilm \$2.00; Xerox \$6.00. 123 pages.

MOLECULAR-ORGANIC COMPLEXES OF TETRACAINE

(L. C. Card No. Mic 58-7987)

Arthur Victor Puccini, Ph.D. Purdue University, 1958

Major Professor: Alfred N. Martin

Several methods were utilized and evaluated for determining molecular-organic compounds. The solubility method was found to be the most useful and advantageous for studies with Tetracaine HCl.

The solubility method for testing molecular-organic

compound formation was employed to study the interaction between Tetracaine HCl and succinimide, N-methylsuccinimide, acetamide, N-methylacetamide, N,N-dimethylacetamide, dextrose and acetone. The degree of interaction between Tetracaine HCl and these compounds varied, and Tetracaine HCl and N-methylsuccinimide gave the greatest degree of interaction, as indicated by the amount of Tetracaine HCl solubilized.

Since the pH was not held constant during these studies, the effect of pH on the solubility of Tetracaine HCl and the Tetracaine HCl-N-methylsuccinimide complex was evaluated. It was found that between the pH of 2 to 5 the solubility of Tetracaine HCl and the Tetracaine HCl-N-methylsuccinimide remained constant. When a monobasic-dibasic sodium phosphate buffer was employed for higher pH values, it was shown that the buffer changed the solubility. This, however, was shown to be due to complexation rather than a pH effect.

The Tetracaine HCl-N-methylsuccinimide complex was compared pharmacologically to solutions of Tetracaine HCl. The methods employed were the corneal and infiltration anesthesia methods; the results showed no significant difference for the degree and duration of anesthesia between the complexed and uncomplexed forms.

The stability constants for the detected Tetracaine HCl complexes were determined, assuming that a uni-uni molecular interaction took place. The values of these stability constants were low, indicating that the interaction between Tetracaine HCl and the various complexing agents employed was rather weak.

Microfilm \$2.00; Xerox \$6.00. 122 pages.

PHILOSOPHY

MORAL REASONING

(L. C. Card No. Mic 58-7391)

Robert Williams Binkley, Ph.D. University of Minnesota, 1958

Recent developments in moral philosophy have brought the question "What is moral reasoning?" more and more to the fore, and this dissertation attempts to provide an answer. The solution proposed is in many respects an old-fashioned one. Moral reasoning is a species of reasoning, and reasoning is a mental process of inference in which thoughts follow each other according to logical principles. In this frame-work, the fact that a certain reasoning process has occurred explains why the reasoner has the belief which was the conclusion of the reasoning, if the reasoning was theoretical, or why he reached the decision which was the conclusion of the reasoning, if the reasoning was practical. This is perhaps the central idea of the dissertation.

This view sounds very much like the doctrine of the Ghost in the Machine which has been attacked by Ryle, but an interpretation is placed on it which avoids Ryle's criticisms, and which reconciles it with behaviorism in scientific psychology.

On this view, moral reasoning is treated on the model

of deductive reasoning, and this treatment is defended against the attacks against it raised by Toulmin, Baier, Hampshire, Griffiths, Hart, and others, who are grouped together as members of the "Indefinite school." The Indefinite position is found to rest on sound insights, but a distinction between the logic and the dialectics of a concept permits these insights to be incorporated in the argument. Some of these points are illustrated by a description of simplified justification games, and it is argued that justification games in principle are transformable into calculi. A case finally is made for the existence of a principle of sufficient reason in ethics.

The theory also runs against the views of the emotivists and others who imply that there can be no such thing as practical reasoning, since there is a logical gap between thinking, which deals with propositions, and action, which gap must be filled by non-rational attitudes or emotions. Ayer's more recent views are considered here, and found to be wanting. Hare's imperativism is then considered, and found to rest on a mistaken analysis of the logic of imperatives. Finally an account of practical reason based on the logic of intentions, and closely resembling Sellars' views, is developed and defended. This theory is applied to the special case of moral reasoning and action on principle. Action on principle is to be regarded as action

which is to be explained as the outcome of reasoning from factual premisses describing the circumstances to an intention to do the action. Accepting the relevant moral principle is identified, with certain qualifications, with accepting the inference principle authorizing this reasoning.

In addition to the philosophers mentioned above, various views of Stevenson, Nowell-Smith, Casteneda, Geach, Austin, and Strawson are discussed at some length.

Microfilm \$3.80; Xerox \$12.80. 295 pages.

REINHOLD NIEBUHR AND A PROTESTANT PHILOSOPHY OF EDUCATION

(L. C. Card No. Mic 58-7615)

John Knox Coit, Ph.D. New York University, 1958

Chairman: Professor Louise Antz

This dissertation, raising the question whether Reinhold Niebuhr's analyses of the human situation and of the Christian faith have any important implications for educational philosophy, concludes in the affirmative. The substantiating evidence was found through logical analysis of Niebuhr's principal writings, with special attention to his doctrine of man, his socio-ethical theory, and his theology.

Niebuhr's interpretation of the Christian faith unites elements from three traditions: (1) the Christian doctrines: of sin and redemption, and of human life as meaningful only when related to a transcendent order, which is the norm and critic of life; (2) the principle of classical humanism that the good life is the development of the whole man in the temporal order; (3) the principle of pragmatism which sees the particular ends and means of life as ever changing and under need of constant criticism. The integration of these three principles is probably the most significant contribution Niebuhr makes to educational philosophy, for theorists often consider these powerful contemporary positions to be incompatible.

Niebuhr believes that man can and should pose the great philosophical questions, but argues that man fails to achieve completely coherent answers--principally because no rational system can account for his unique personality. Rational systems must subordinate the individual and the unique to the universal. But man transcends the universal and himself in his search for understanding.

Self-transcendence, the key to Niebuhr's anthropology, makes possible self-awareness, individuality, and freedom. Through it man transmutes the biological into a spiritual dimension and through it seeks for a principle of understanding which, however, always eludes his rational grasp. Man is thus uneasy and anxious in his "existential condition."

The Christian revelation, appearing as insights in Hebrew history, and especially in the person of Christ, proclaims that ultimate reality is a personal Creator-God; that man is created in His image; and that the key to man's essence is his freedom. Man's refusal to exercise this freedom to live in faith in God and in community with men is interpreted by the Christian faith as sin. At the same time, God's forgiveness is proclaimed and man is commanded to love God and his neighbor.

The primary educational problem is to establish the right God-relationship. This involves repentance for sin and response to the divine imperative to love. To love means to seek to promote the "natural good" of every person, which can be done only in community and only by seeking to develop in the temporal order the whole personality of every man, for man's historical existence is, perse, an order of creation and the divine address is to all men.

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Man's "natural good" is inescapably pursued through the development of his physical capacities, through the family, the economic and political institutions of society, and the forms of art and vocation. But the specific forms of man's cultural life cannot be finally determined, for man constantly employs his freedom to project new ways of expressing his vitality, and human sin constantly corrupts them. These truths are shown through literature, the arts, history, and the social sciences.

The Christian home, the church and its agencies, the church-related college, and the individual Christian must seek to mediate the grace of God through the constant expression of love in all human relations; must provide for the significant exercise of freedom in the development of all the capacities of the individual; must maintain constant criticism of the ideas and practices of the non-Christian world in the light of the Christian understanding of man; and must prepare the Christian citizen to live in a changing world which can never expect complete redemption in time.

Microfilm \$3.35; Xerox \$11.40. 260 pages.

DOES KARL JASPERS' "PHILOSOPHIE" JUSTIFY HIS INDICTMENT OF THE GERMAN PEOPLE IN 1945?

(L. C. Card No. Mic 58-7724)

Elsa Linda Haller, Ph.D. University of Michigan, 1958

Karl Jaspers returned to the University of Heidelberg late in 1945 after an enforced retirement of ten years. At that time he delivered the lectures that involved the question of the guilt of the German people for the rise of Hitler and National Socialism. After defeat and humiliation, Jaspers faced these questions courageously and unflinchingly. The purpose of my study has been to investigate whether his metaphysics entitled Philosophie justifies the indictment of the German people.

In Part I of my study there is the exposition and analysis of this question of guilt. Jaspers begins his lectures with the statement, "Now there can be truth instead of propaganda." His desire was for a self-examination of the German people. He distinguishes four kinds of guilt: criminal, political, moral and metaphysical. The first two are outward, the last two inward for the individual. The conclusion he arrives at is that only a very limited number of Germans are responsible for the outrages of the Nazis. However, all Germans are politically guilty. People of a nation are responsible for the type of government that they have. In regard to moral guilt each one must question himself to what extent he fostered the regime. Yet, as a German he, all Germans, must feel collectively the moral

guilt. In the metaphysical guilt is man in his naked soul before Transcendence.

In Part II there is an exposition of the ideas of Hitler as found in Mein Kampf. His hatred of any democratic form of government, his intense racial feelings and consequently his distrust of all people of other races are brought out. The doctrine of purity of race and the superiority of the white race, of the Aryan, are delineated. The development of the party, the stipulations for citizenship of the new state are brought out. Before evaluating these ideas the story of Hitler's press agent is briefly told. Dr. Otto Dietrich claims that outwardly he was a savior of the German people, inwardly a man driven by demonic forces -- thus a split personality. Since the German people are prone to follow unquestioningly a leader, he concludes, a democratic form of government can alone save them in the future. However, the German people did not give him the mandate to make war. There Hitler alone is guilty. Thus he differs from Jaspers.

In Part III is an exposition of the ideas in Philosophie, particularly those relevant to my problem, and an evaluation of Hitler's ideas. In the Introduction, Jaspers says that the aim of philosophy has always been the search of Being. But Being is not an all-embracing Being for him. Rather it is divided and a leap must be made from one level to another. There is the scientific explanation of the world. The mental sciences of psychology and sociology are paramount. Also anthropology was an interest. He rejects both self-enclosed Positivism and Idealism. The world is not closed, he claims. From the point of view of science the ideas of Hitler are examined and evaluated. The distinction between religion and philosophy, what is common to both, what Jaspers' philosophical faith is, is discussed.

The Being, that is not in phenomenal existence, is the Existenz of man. At the outset Jaspers says, "It is I myself. It is I as long as I do not become an object. If I want to grasp it, it escapes, for it is not a psychological subject. In its possibility, I feel myself deeper rooted than when I become a subject." Existenz for Jaspers is in the polarity between subjectivity and objectivity as existence that appears. This probing and frustration of self is, in order for man to know his will, to make his decisions and thus to know freedom and through his conscience to choose between good and evil. Throughout, there is a critique of Hitler's ideas in the light of this illumination of Existenz.

Finally, Truth for Jaspers remains unconditional, not a point of view; existential not universal; historical not timelessly valuable; on the way not completed. It is a struggle that ends in the transcendent. That struggle Hitler never knew. The conclusion for the writer is that Jaspers' Philosophie justifies his indictment. It is left for the reader to draw his own conclusions.

Microfilm \$2.50; Xerox \$8.80. 192 pages.

CONTRIBUTIONS TO THE THEORY OF INDUCTIVE PROBABILITY

(L. C. Card No. Mic 58-7851)

Richard C. Jeffrey, Ph.D. Princeton University, 1957

Let m be the <u>belief function</u> of a person A at a certain time; that is, for each proposition p in a certain set, C, m(p) is A's <u>degree of belief</u> in p. It is known that for m to be rational, m must be a <u>regular</u> probability measure on C, i.e., m must be a probability measure which assigns the value 1 only to the logically necessary proposition, t. If m_p is A's <u>conditional</u> belief function, such that $m_p(q) = m(pq)/m(p) = A's <u>degree of belief in q conditionally upon p</u>, then <math>m_p(p) = 1$. Therefore, m_p is not regular unless p = t, in which case $m_p = m$.

Suppose A comes to believe p, i.e., to regard p as almost certain. Since m_p is not regular, it is irrational for A to change his belief function from m to m_p in response to his new belief. Then the method of "conditionalization" is never strictly correct as a way of taking factual evidence into account. However, if a, the new degree of belief in p, is close to l, the method of conditionalization will be nearly correct. But if a is, e.g., 3/4, conditionalization is simply inapplicable.

In place of conditionalization, we propose a change from the belief function m to the belief function m¹, where

$$m^{1}(q) = am_{p}(q) + (1-a)m_{-p}(q)$$
,

as a way of integrating a, the new degree of belief in p, into a system of beliefs. It is proved that when new degrees of belief in a set of propositions which are statistically independent according to m are successively integrated in this way, the final belief function is the same, regardless of the order of integration. It is also shown that if a > m(p), the degree of belief in q is increased, decreased, or unaffected by the transformation from m to m1 accordingly as p is positively relevant, negatively relevant, or irrelevant to q according to the old belief function, m. (p is positively relevant to q with respect to m just in case $m_p(q) > m(q)$; negatively relevant just in case $m_p(q) <$ m(q); irrelevant just in case $m_p(q) = m(q)$.) The scheme is also generalized to accommodate the case where the set of propositions for each of which belief changes is not statistically independent.

The second set of results concerns the confirmability of laws. It is shown that the simple law $(x)P_x$ is confirmable-- $m((x)P_x) > 0$ -- just in case the infinite series whose s'th term is $m_{P_{a_1}P_{a_2}} \dots P_{a_{S-1}}$ (- P_{a_S}) converges.

This means that after a certain amount of evidence has been accumulated, "learning from experience" must proceed at a high rate. For example, if $m_{\mathbf{P}_{a_1}} \dots P_{a_{S-1}}(-P_{a_S})$

is constant for the first thousand values of s, and then, starting with s = 1001, each term is half of its predecessor, the law $(x)P_x$ is confirmable.

It is shown that among the m-functions determined by lambdas (cp. Carnap's Continuum of Inductive Methods) which are independent of s, only the "straight rule" (λ = 0) assigns positive probabilities to laws. However, the straight rule is objectionable because it assigns degree of confirmation 1 to (x)P_x on the basis of a single observation, P_{a1}.

If lambda decreases at a sufficiently high rate as s increases, the corresponding inductive methods permit laws to be confirmable. For example, k = 1/s decreases rapidly enough.

We do not attach the same importance that Carnap

does to the selection of an m-function, since in our scheme, accumulating evidence tends to obliterate the influence of the initial belief function, m.

Microfilm \$2.35; Xerox \$8.20. 177 pages.

PHYSICS

PHYSICS, GENERAL

THEORY OF MANY-BOSON SYSTEMS

(L. C. Card No. Mic 58-7219)

Marvin Denham Girardeau Jr., Ph.D. Syracuse University, 1958

The problem of obtaining energy eigenstates and eigenvalues of a system of n bosons interacting by a spherically symmetric pair potential is treated by non-perturbation methods. First Bogolubov's approximate states are generalized so as to involve an arbitrary function in k-space which is to be determined to give the best variational approximation to the ground state. The integral equation whose solution determines the variational ground state is derived, and various physical properties of this state and the associated excited states are examined. These lowlying variational states are then extended so as to obtain a class of exact eigenstates of the total Hamiltonian (the "phonon eigenstates") with an energy spectrum differing from that of the variational states only by being shifted downward bodily by an amount proportional to nz. The adiabatic hypothesis does not hold for these states in the sense that they do not approach the unperturbed (variational) states as the interparticle interaction is allowed to approach zero. However, they differ from the variational states only through the presence of components with zeropoint phonons which are absent from the simpler variational states. Finally, we attempt to answer the question of how well these true eigenstates approximate the lowest eigenstates. In the course of this discussion we obtain another class of true eigenstates, the "free-particle" eigenstates. By an analysis of the relationship between the phonon eigenstates and the free-particle eigenstates, which is analogous to that between the lowest eigenstates and the phonon eigenstates, it is concluded that the phonon eigenstates lie above the true ground state by an amount proportional to n, although they lie lower than Bogolubov's states by an amount proportional to n.

Microfilm \$2.00; Xerox \$4.40. 85 pages.

TEMPERATURE VARIATION OF THE ABSORPTION OF SOUND IN CARBON DISULPHIDE AND ETHYLENE

(L. C. Card No. Mic 58-5270)

James Cleveland Gravitt, Ph.D. Vanderbilt University, 1958

Supervisor: Professor Robert T. Lagemann

The relaxation absorption of sound in carbon disulphide, at temperatures between 0 and 160 degrees centigrade, and ethylene, at temperatures between 0 and 60 degrees centigrade, has been obtained for frequencies between 50 kilocycles and 4 megacycles per atmosphere. The data were obtained by the tube method employing a frequency range from 2 to 5 kilocycles and a pressure range from 1 mm to 2.4 cm of mercury. At each temperature both gases exhibited only one absorption band in the frequency/ pressure range covered. This indicates that the specific heat relaxes through the agency of only one vibrational mode or if other modes are operative, their effect is beyond the operating range of the present equipment. The data obtained agrees with the theoretical predictions based on the vibrational specific heat calculated from spectroscopic data.

The transition probabilities and collision efficiencies for both gases were calculated from the experimental data. The resulting values for both gases indicate that the probability, in a collision, of exciting or de-exciting molecular vibrations depends upon the relative velocity of approach of the two colliding molecules. Binary collisions were found to be responsible for the excitation of vibrations.

The present data indicate that the frequency at which maximum absorption occurs is a logarithmic function of the absolute temperature. The theoretical explanation for this fact is not yet known.

Microfilm \$2.00; Xerox \$4.40. 85 pages.

CALCULATION OF THE ENERGIES OF TRIATOMIC HYDROGEN USING A MODIFIED ROOTHAAN PROCEDURE

(L. C. Card No. Mic 58-5958)

Willard Edward Meador, Jr., Ph.D. The University of North Carolina, 1958

Supervisor: Wayne A. Bowers

The simplest triatomic system, H₃, has received a great deal of attention over the past twenty five years. In the present paper potential energies for some linear, symmetric configurations of the molecule have been calculated using a modified Roothaan procedure with configuration interaction and including a variable shifting parameter. Calculations for two excited states are given and comparison of ground state energies with other work is made.

Because of the non-closed shell character of $\rm H_3$, the self-consistent field procedure had to be applied to two simultaneous matrix equations instead of the single one appearing in the simpler theory. Results indicated that the inclusion of a shifting parameter had very little effect on anything, but this may be due to the fact that the screening constant was not varied simultaneously. Values of the latter were obtained from previous work by Hirschfelder.

The final ground state energy curve was found to fall between Hirschfelder's Wang and Wang plus ionic terms calculations and was considerably better than any obtained previously using molecular orbital methods. Results for the binding and activation energies were 62.45 and 29.79 kcal/mole, respectively, which are far different from the corresponding experimental values of approximately 101 and 8.5.

On the basis of this and other calculations, several improvements in the trial wave function are suggested for future work in this field. It appears to this author, however, that anything very much short of the James and Coolidge type function, where electronic interactions are included in an infinite sum of terms, will not be sufficiently accurate, due to the faulty charge distributions, to be used for reaction rate calculations.

Finally, a discussion is presented in regard to the application of potential energy surfaces to the calculation of reaction and dissociation rates, and also concerning an extension of the present procedure to more complicated systems.

Microfilm \$2.00; Xerox \$4.60. 89 pages.

OPTICAL CONSTANTS OF EVAPORATED SELENIUM

(L. C. Card No. Mic 58-7952)

Frederick Kirk Odencrantz, Ph.D. University of Utah, 1958

Chairman: Dr. Franklin S. Harris, Jr.

The complex index of refraction, $\bar{\mu}=\mu$ - ik, of evaporated selenium films has been determined over the wavelength range from 0.23 to 2.50 microns. The values have been determined from measurements of film thickness, reflectance and transmissivity by the method of successive approximations.

The preparation of the samples and the measurements are described. The film thicknesses were determined using multiple beam interference techniques; the reflectivities were measured using a Muller-Hilger monochrometer and a Strong-type reflectometer, and the transmission measurements using a Cary and/or a Beckman spectrophotometer.

Sample data is presented and values of μ and k are given in both tabular and graphical form.

Microfilm \$2.00; Xerox \$4.00. 74 pages.

THE SPECIFIC HEAT OF SOME SOLIDS AT LOW TEMPERATURES

(L. C. Card No. Mic 58-7994)

George Merle Seidel, Ph.D. Purdue University, 1958

Major Professor: P. H. Keesom

I. An apparatus employing a bath of liquid He³ as a coolant has been developed for measuring specific heats below 1°K. Temperatures as low as 0.30°K can be maintained for long periods of time. A description of a simple thermal switch is also included.

II. Using this He³ cryostat the specific heat of gallium has been measured between 0.35° K and 4.3° K, and of zinc between 0.42° K and 4.2° K. Measurements on Ga in the normal state indicate that the coefficient of the electronic specific heat, γ , is .601 millijoule/mole (°K)² while the Debye 9 at 0°K is 317°K. For Zn, γ = .640 millijoule/mole (°K)²; 9 = 309°K. The electronic specific heat in the superconducting state, C_{es} , for both metals for T well below the transition temperature, T_c , can be represented by the expression $C_{es} = a \gamma T_c e^{-bT_c/T}$. For Ga, $T_c = 1.087^{\circ}$ K, a = 7.0, and b = 1.35. The zinc sample measured has a broad transition, T_c taken as 0.852° K. Also for Zn, a = 6.4 and b = 1.27. The magnetic threshold field curves are calculated from these specific heat results. The critical field at 0° K for Ga is 59.4 gauss and for Zn, 53.4 gauss.

In comparing these measurements with the calorimetric results of other superconductors a definite variation is noted in the parameters a, b, $(C_{es} - C_{en})/\gamma T_c$ at T_c , and $\gamma T_c^2/V_m H_O^2$. There appears to be a correlation between the magnitudes of these quantities and the transition temperature

III. The specific heats of several pure and degenerate samples of silicon have been measured between 1.2° K and 4.2° K. The Debye 0 at 0° K is 638° K, a value slightly lower than previously reported. Similar measurements of germanium between 0.5° K and 4.2° K yield $0 = 363^{\circ}$ K, in very good agreement with older results.

From knowledge of the electronic specific heat and carrier concentration of a degenerate semiconductor, it is possible to deduce information concerning the energy band structure of the crystal. Measurements of n type germanium indicate that there are four energy minima in the conduction band of this substance. Similar measurements of silicon indicate that there are six minima in its conduction band. The effective masses of the conduction carriers calculated from this work on degenerate samples are not appreciably different than found from cyclotron resonance experiments on pure crystals. This result which is not

inconsistent with the assumption that addition of impurities does not change the density of states at the band edge.

IV. The specific heat of a boron doped silicon crystal, which was first irradiated with thermal neutrons and then annealed, showed a pronounced peak at the normal λ temperature of liquid helium. The anomaly is due to the existence of helium inside the ingot, this helium being created by the boron-neutron reaction $B^{10} + n^1 \rightarrow He^4 + Li^7$. On annealing, helium collected in macroscopic defects within the crystal, so that at low temperatures the gas liquefied and produced the anomalous specific heat.

Microfilm \$2.00; Xerox \$5.00. 100 pages.

PHYSICS, ELECTRONICS AND ELECTRICITY

SECONDARY ELECTRON EMISSION PRODUCED FROM SURFACES BY POSITRON BOMBARDMENT

(L. C. Card No. Mic 58-7829)

William H. Cherry, Ph.D. Princeton University, 1958

An experimental procedure, involving single particle counting techniques, has been developed for bombarding the surface of a solid with positrons, and comparing the secondary electron emission produced by these positrons with the secondary emission obtained when electrons are used as the primary, bombarding particles. The average numbers of secondary electrons below approximately 20 volts energy, produced from an activated magnesium-silver target by bombardment with 940 volt positrons and electrons, were $1.6\pm.3$ and $4.8\pm.4$ respectively. The electrons were $3.0\pm.3$ times more efficient than the positrons in producing secondary emission. This disproportion cannot be accounted for by positron annihilation effects, and is probably the result of charge polarity sensitive factors in the secondary emission excitation process.

With primary positrons, triple coincidence between emission of the secondary electrons and the two annihilation quanta was observed and used to check the validity of the measuring apparatus. The quantitative results were derived from pulse height distributions, the secondary electron pulse from each primary particle being amplified in a high gain, low background electron multiplier. The sealed-off vacuum apparatus also included an ionization gauge pump, a positron accelerator lens system and velocity selector, a mercury pool gamma ray shield, and, for admitting positrons from external radioisotopes, a thin mica window with a 200 Å layer of chromium evaporated on its inner surface. Additional experiments were made with two hundred kilovolt positrons, gamma rays, ultraviolet photons, and certain unidentified positive ions which appeared at the mica window when it was subject to either positive or negative beta bombardment. In the high energy interactions, the statistics gave evidence of the occurrence of chain processes. The annihilation radiation, as a means for tracing the positrons, enabled the differentiation of the secondary emission caused by primaries absorbed in the target from that caused by back-scattered primaries. Positrons in the energy interval 0-5 volts, very numerous in comparison to those in equal intervals at somewhat higher energies, were emitted from the chromium on mica surface when it was irradiated by a Cu⁶⁴ positron beta spectrum. This arrangement was particularly useful as a positron source for the secondary emission measurements, and for the future, in improved apparatus design, can be the means for supplying a substantial flux of low energy positrons, perhaps as much as a few thousand per second. This slow emission phenomenon also possesses many interesting features as being itself a subject for study.

Microfilm \$2.25; Xerox \$7.80. 170 pages.

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PHYSICS, NUCLEAR

ASSOCIATED PRODUCTION OF STRANGE PARTICLES BY NEGATIVE PI MESONS

(L. C. Card No. Mic 58-3643)

John Lothrop Brown IV, Ph.D. University of Michigan, 1958

The associated production in hydrogen of strange particles by the reactions:

$$\pi^{-} + p \rightarrow \Sigma^{-} + K^{+}$$

$$\pi^{-} + p \rightarrow \Lambda^{0} + \theta^{0}$$

$$\pi^{-} + p \rightarrow \Sigma^{0} + \theta^{0}, \ \Sigma^{0} \rightarrow \Lambda^{0} + \gamma$$

has been studied in a 12" x 5" x 5" propane bubble chamber. 31,000 pictures were taken in a beam of 1.23 Bev/c π^- mesons produced by the Cosmotron at Brookhaven National Laboratory. Identification of individual events was based on kinematical arguments using the event reconstructed in real space from measurements on the stereographic film negatives. 51 cases of the first reaction were found, 15 of the second (in which both the Λ^0 and θ^0 were observed to decay via charged modes), and 14 of the third (in which both the Λ^0 and θ^0 were observed to decay via the charged modes) giving total cross sections of

$$\sigma(\Sigma^{-}K^{+}) = 0.19 \pm 0.05 \text{ mb}$$

 $\sigma(\Lambda^{0}9^{0}) = 0.24 \pm 0.09 \text{ mb}$
 $\sigma(\Sigma^{0}9^{0}) = 0.17 \pm 0.07 \text{ mb}$

where the errors quoted are standard deviations. The center of mass angular distributions of production were not isotropic; the Σ^{-1} 's were emitted preferentially in the forward direction, while the Λ^{0} and Σ^{0} were emitted in the backward direction.

By studying the distribution of actual and potential decay lengths one was able to deduce the following lifetimes for Σ^- , Λ^0 , and θ^0 :

$$(\Sigma^{-}) = 1.67^{+0.40}_{-0.28} \times 10^{-10} \text{ sec.}$$

 $(\Lambda^{0}) = 2.24^{+0.79}_{-0.48} \times 10^{-10} \text{ sec.}$
 $(9^{0}) = 0.74^{+0.21}_{-0.15} \times 10^{-10} \text{ sec.}$

The errors quoted represent 63% confidence limits. By studying the decay angular distributions of the Σ^- , Λ^{0} and θ^{0} in their own center of mass one was able to examine the questions of intrinsic spin and parity nonconservation in decay interactions. The data was consistent with (but did not imply) spins of 1/2 for the Σ^- and Λ^0 and spin 0 for the θ^0 . The data was also consistent with (but did not imply) parity conservation in the decays of the Σ^- , Λ^0 and θ^0 . Microfilm \$2.00; Xerox \$4.60. 89 pages.

A CLOUD CHAMBER INVESTIGATION OF NEUTRAL STRANGE PARTICLES

(L. C. Card No. Mic 58-7848)

Judson Hardy, Jr., Ph.D. Princeton University, 1958

The results presented fall into three parts: angular distribution in λ decay, mean lifetime of θ_2^0 , and decay modes of θ_2^{0} . The first two were obtained by the Princeton multiplate cloud chamber at the Cosmotron, the third by the Princeton double cloud chamber apparatus using the cosmic radiation as a source of events.

1. Analysis of λ 's produced by interaction of 1.5 Bev π - in lead, iron, and carbon gave the following results. The polarization axis was defined as the normal to the production plane, $\overrightarrow{P_{in}} \times \overrightarrow{P_{\lambda}}$, where $\overrightarrow{P_{in}} = \text{laboratory momentum}$ mentum of the incident π and $\overrightarrow{P_{\lambda}} = \text{laboratory momentum}$ of the λ . Defining θ as the angle between the laboratory momentum of the decay π and the polarization axis, the distribution is 1 + P α cos 0 (Lee, 1956 and 1957) where P is the polarization and α is the asymmetry coefficient for fully polarized λ 's. \overline{P} is the average of P over production angles. Ninety-one λ 's produced in lead showed no asymmetry, $\overline{P}\alpha = 0.00 \pm 0.18$. There is less than a 4% chance that these .\(\lambda\)'s are from the population observed by the bubble chamber groups (Eisler, 1957a) who found $\overline{P}\alpha$ = 0.52 ± 0.10 for λ 's from the primary reaction $\pi^- + p$ $\rightarrow \lambda + 9^{\circ}$ in the π^- energy range 0.9--1.10 Bev. Thirtytwo \(\lambda\)'s produced in carbon and 15 \(\lambda\)'s produced in iron also showed no asymmetry.

A separation of the events in lead according to the cosine of their laboratory production angle, I·C, showed no asymmetry for I·C \geqslant 0.6. Those events with I·C < 0.6 showed an asymmetry but with limited statistical validity (10 up, 4 down). An attempt to separate those events kinematically consistent with the simple $\pi^- + p \rightarrow \lambda + \theta^0$ reaction produced a small sample which showed no asymmetry.

Lack of asymmetry is attributed to a possible decrease of polarization with energy, scattering of λ , and admixture of other reactions, especially $\pi^- + p \rightarrow \Sigma^0 + \theta^0$.

- 2. Observation in a neutral beam at the Cosmotron of four events interpreted as $\theta_2^{\ 0}$ decays at a target-chamber distance of 60 feet, in conjunction with results of the Columbia cloud chamber group (Lande, 1957), leads to a mean lifetime for θ_2^0 : $\tau_{\theta_2^0} = (3.8 \pm 2.3) \times 10^{-8} \text{ sec.}$
- 3. Five anomalous V⁰ events were observed among 55 analyzed λ 's and θ^0 's found in the double cloud chamber apparatus. Decay secondaries were identified by measurement of momentum, ionization, and range. The events are consistent with decay modes in analogy to those of 0^{\pm} .

Two events are probably $e^+\pi^-\nu$; one can be this but can also be $\pi^0 \to e^+ + e^- + \gamma$; one is $\mu^+\pi^-\nu$; and one is either $e^-\pi^+\nu$ or $\mu^-\pi^+\nu$.

Microfilm \$2.25; Xerox \$7.80. 169 pages.

THE DISINTEGRATIONS OF THE RADIOACTIVE ISOTOPES IODINE-131 AND SCANDIUM-43

(Publication No. 25,445)

Joseph Richard Haskins, Ph.D. The Ohio State University, 1952

THE DISINTEGRATION OF I^{131} The disintegration of I^{131} has been of considerable interest in the field of nuclear spectroscopy. Emery (1) has advanced the most recent decay scheme, which is an extension of the one proposed by Metzger and Deutsch (2). It has been largely substantiated by the measurements of Ketelle et al (3), who used a thin lens spectrometer and a scintillation spectrometer to determine which beta rays are in coincidence with the particular gamma rays. Verster et al (4), as a result of Ketelle's measurements, were able to apply shell model concepts to make a level assignment. The schemes proposed by the preceding authors are shown in Fig. 1.

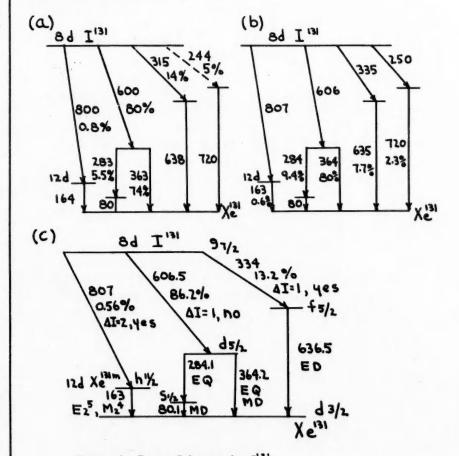


Figure 1. Decay Schemes for I¹³¹ (a) Emery; Metzger and Deutsch (b) Ketelle, Zeldes, Brosi and Dandl

(c) Verster, Nijgh, Van Lieshout and Bakker

The purpose of this investigation was to extend the available information on the internal K conversion coefficients and internal K to L conversion ratios of the gamma rays of Xe¹³¹. Since the theoretical K conversion coefficients for M1 and E2 transitions of a 284 kev. gamma ray

are nearly the same, it was of interest to obtain a measurement of its K to L conversion ratio to determine which assignment, M1 or E2, is correct. Also, it was of interest to make a special effort to determine the internal K conversion coefficient for the 723 kev. gamma ray.

Experimental Procedures and Results

A thin magnetic lens spectrometer was used to obtain the negatron and photoelectron spectra.

To determine the relative intensities of the gamma rays of Xe¹³¹, the photoelectron spectrum was measured, using tin, lead, and uranium as radiators. Intensities were evaluated by finding areas under peaks in a plot of N/I vs. I (N in counts/minute and I in amperes), and after subtracting Compton background and then correcting for photoelectric absorption coefficients. The relative intensities are listed in Table I, where the intensity of the 364 kev. gamma ray is taken as 100.

TABLE I

Experimental Results

Energy of gamma (kev.)	Relative Intensity of gamma	Relative Intensity of* conversion electrons		K/L ratio	K conversion coefficient
284	6	K L	14.6 4.7	3.3	0.052
364	100	K L	100 16.7	5.6	0.021
638	10	K+L	1.8		0.0040
723	3	K+L	0.5		0.0034

*The intensity of the 606 kev. continuous beta ray spectrum is 5400 relative to an intensity of 100 for the K internal conversion electrons of the 364 kev. gamma ray.

The negatron spectrum was examined to obtain the relative intensities of the various groups of internal conversion electrons. In order to subtract the counting rates due to the continuous beta spectrum from the total counting rates, the continuous beta distributions were determined from a Fermi plot analysis. Corrections, at the end points of the 606 kev. and 334 kev. continuous spectra, for resolution of the spectrometer, were carried out. The relative intensities of the internal conversion electron groups are found in Table I, where the intensity of the K internal conversion electron group of the 364 kev. gamma ray is taken as 100.

The K shell internal conversion coefficients were determined, using as a standard the value 0.097 for the K shell conversion coefficient of the 663 kev. gamma ray of Cs¹³⁷. Sources of Cs¹³⁷ and I¹³¹ were prepared, so that, in each case, the same sample could be used to measure both internal conversion electrons and photoelectrons. The same sample holder, radiator, and geometry were used in the two cases.

The K shell internal conversion coefficients and the K to L conversion ratios which were obtained are listed in Table I. A comparison of these values with the empirical

K to L ratio curves of Goldhaber and Sunyar (5) and the theoretical values for internal conversion coefficients of Rose et al (6) leads to the assignment of the 284, 364, 638 and 723 kev. gamma rays as electric quadrupole transitions.

Discussion

No alternative to Verster et al's (4) assignment (Fig. 1) of $d_5/2$ to the 364 kev. level is found, even though it is believed that the 364 kev. gamma ray is an E2 transition and Weisskopf's (7) theory would predict an M1 transition to be many times more probable. This may be explained if it is postulated that M1 transitions are forbidden with respect to E2 transitions between levels with the same L and with I differing by 1 (between a $d_5/2$ level and a $d_3/2$ level). However, where two levels have L differing by 2 and I differing by 1, M1 is the more probable transition (between an $s_1/2$ level and a $d_3/2$ level).

The log (ft) values for the three beta ray transitions with energies of 606 kev., 334 kev., and 250 kev., and having 89%, 8%, and 2.5% for their respective relative abundances, are 6.7, 6.8, and 6.9, respectively. Nordheim's classification (8) allows these transitions to have selection rules of either $\Delta L=1$ and $\Delta I=0,1$ or $\Delta L=2$ and $\Delta I=1$. When $g_{7/2}$ for the ground state of I^{131} and $d_{3/2}$ for the ground state of X^{131} are used, the selection rules $\Delta L=1$ and $\Delta I=1$ for a beta transition give an excited level $f_{5/2}$ and an E1 transition to the ground state of X^{131} . The selection rules $\Delta L=2$ and $\Delta I=1$ would give an excited level $d_{5/2}$ with an M1 or E2 transition to the ground state.

Since the measurements of this investigation indicate that the 638 kev. and the 723 kev. transitions are both E2, the level scheme of Fig. 2 is proposed with the 364 kev., 638 kev., and 723 kev. levels all $d_5/_2$ and with the requirement that M1 transitions with selection rules $\Delta L=0$ and $\Delta I=0,1$ be forbidden.

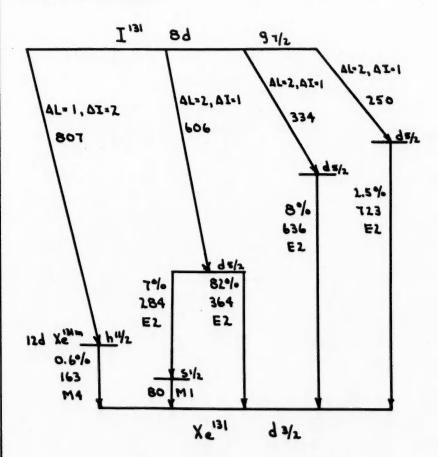


Figure 2. Proposed Level Scheme for I¹³¹

THE DISINTEGRATION OF SC43

Both the positron and photoelectron spectra of radioactive Sc^{43} were investigated. For these investigations enriched $Ca^{43}CO_3$ (72.13 per cent Ca^{43} , 5.17 per cent Ca^{44}) was bombarded with \sim 7 Mev. protons, and common $CaCO_3$ (97 per cent Ca^{40}) was bombarded with \sim 20 Mev. alpha particles in the Ohio State University cyclotron.

Positron Spectrum

Carrier-free samples of scandium produced by both proton and alpha-bombardments were prepared by a chemical separation of the active scandium from the calcium.

The positron spectrum of the active scandium, produced by bombarding Ca^{4 3} with protons, was studied in a solenoidal spectrometer. The Fermi plot of this spectrum, the data having been corrected for 3.9 hour half-life, reveals three components. The highest energy component, having an end point of 1.46 Mev. and a relative abundance of 11 per cent, is identified as belonging to Sc^{4 4} (9). The main component has an end point of 1.19 Mev. and a relative abundance of 71.5 per cent. A third component, with a relative abundance of about 16 per cent has an end point energy of 0.76 Mev.

The positron spectrum of the scandium produced by bombarding Ca⁴⁰ with alpha particles was studied in a thick-lens spectrometer. The Fermi plot for this spectrum reveals only two components. The 1.46 Mev. component is not observed, showing that it does not belong to Sc⁴³. The first component has an end point of 1.18 Mev. with a relative abundance of 76 per cent, and the second component has an end point of 0.77 Mev. with a relative abundance of 24 per cent.

In both Fermi plots an upward deviation from the straight line occurs at low energies. The decay followed a 3.9 hour half-life in all regions of the spectrum for more than 20 hours after the start of measurements (for both the proton and alpha bombardments).

Photoelectron Spectrum

For the investigation of the photoelectron spectrum, the Ca^{4 3} was bombarded with ~7 Mev. protons. The sample was removed from the cyclotron target holder and placed in an aluminum source holder with sufficient thickness to cut out all positrons.

The photoelectron spectrum was obtained with a thin lens spectrometer. A 21 mg/cm² uranium radiator was used for energies below 600 kev. and a 40 mg/cm² uranium radiator was used for higher energies. In addition to the K and L annihilation peaks, a lower energy peak was observed, which decayed with a 3.9 hour half-life. This peak was also observed with a 17 mg/cm² lead radiator. From the positions of the peak with the lead and uranium radiators it is identified as the K photoelectron peak for a 375 kev. gamma ray. The only high energy gamma ray which was observed was one with energy of 1.15 Mev. It is probably the 1.16 Mev. gamma ray for Sc⁴⁴ reported by Bruner and Langer (9).

Conversion Coefficient

Ca⁴⁰ was bombarded with alpha particles and radioactive scandium was separated from the calcium.

The conversion electron peak of the 375 kev. gamma

ray was obtained by utilizing a positron-electron discriminator in the solenoidal spectrometer. The same sample was used to measure, in each case, both photoelectron and conversion electron peaks of the $Cs^{1\,37}$ 663 kev. gamma ray and the $Sc^{4\,3}$ 375 kev. gamma ray. The same sample holder, radiator, and geometry were used for the two gamma rays. Using the K conversion coefficient 0.097 of the 663 kev. gamma ray as a standard, the conversion coefficient for the 375 kev. gamma ray was determined to be 8×10^{-4} . By measurement of several points on the positron spectrum of $Sc^{4\,3}$ with the same sample, it was possible to determine the intensity of the 375 kev. gamma ray to be 13 for every 100 positrons.

Summary

The positron spectrum of Sc^{43} is complex; the main main component has an end point energy of 1.18 ± 0.02 MeV. and the second component has an end point energy of 0.77 ± 0.04 MeV. The branching ratio of the decay of Sc^{43} is estimated, with the aid of the curves of Feenberg and Trigg (10) to correct for K-capture, to be 77 ± 7 per cent of the 1.18 meV. $\beta+$, K branch and 23 ± 7 per cent of the 0.77 meV. $\beta+$, K branch. The log (ft) values for the two $\beta+$ components are 5.1 and 4.8, respectively.

A gamma ray of 0.375 ± 0.002 Mev. is ascribed to the decay of Sc^{43} . It has a relative intensity of 12 ± 4 per cent and a conversion coefficient of $8 \pm 4 \times 10^{-4}$.

In Fig. 3 is given a decay scheme for Sc^{4 3}. This scheme is deduced from the log (ft) values, energies of positrons and the gamma ray, relative intensities of the positron groups and the gamma ray, the conversion coefficient for the 375 kev. gamma ray, and shell theory concepts.

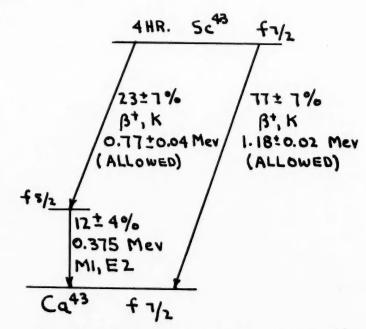


Figure 3. Proposed Decay Scheme for Sc43

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Abstract published by special arrangement with The Ohio State University.

INVESTIGATION OF ERRORS IN PROTON-PROTON SCATTERING CROSS SECTION VALUES

(L. C. Card No. Mic 59-718)

David Jordan Knecht, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor Raymond Herb

Angular distributions for the scattering of protons by protons were remeasured for energies of 1.397, 1.855, and 2,425 Mev in an investigation into the inconsistencies reported by Northcliffe and Berners. The scattering chamber and associated equipment, built by Worthington, Mc-Gruer, and Findley and improved by NB, underwent further modification in order to reduce and control experimental error. Several fundamental quantities not remeasured since the WMF work were remeasured for the present experiment and found to be significantly different from previously-used values. Several experimental corrections were re-investigated with at least one major revision being found necessary. As a result, the experimental cross sections are in many cases in disagreement with those of WMF and NB, and no significant inconsistencies remain. A simple phase-shift analysis has been made incorporating the vacuum polarization and relativistic effects which significantly alter the cross sections theoretically expected for given nuclear phase shifts. The combined revisions of experimental and theoretical cross sections permit the data to be fitted with Coulomb, vacuum polarization, and nuclear S-wave contributions alone; the effective nuclear P-wave phase shift is estimated at less than Microfilm \$2.33; Xerox \$8.20. 179 pages.

STUDIES OF RADIOACTIVE DECAY BY ELECTRON CAPTURE

(L. C. Card No. Mic 58-3948)

Donald Elliott Rehfuss, Ph.D. University of Oregon, 1958

Adviser: Bernd Crasemann

I. The L- to K-capture ratio in germanium-71

Electron capture is a form of radioactive decay, in which the neutron-deficient nucleus absorbs an atomic electron. For medium-weight nuclei, the electron can be captured either from the K-shell or from the L-shell, and the relative probability for these two competing processes can be calculated from the theory of beta decay. In this computation, unknown nuclear matrix elements cancel out, and the result can, therefore, be regarded as quite precise. Consequently, it was considered highly disturbing that Langevin¹ found an experimental value of 0.25 ± 0.02 for the L/K capture ratio in Ge^{7¹}, which is more than twice as large as the theoretical value of 0.11, computed by Rose and Jackson.² If the discrepancy were real, this would mean a serious defect in the theory.

In the present experiment, the L/K capture ratio for Ge^{71} has been redetermined by a new technique. The 62-hour isotope As^{71} , produced in the Crocker Laboratory cyclotron, is used as a source of Ge^{71} , into which it decays under emission of a gamma ray. The latter provides an indication of the amount of Ge^{71} present at a given time. Concurrent measurements of the K x-ray intensity from the Ge^{71} K-capture lead to an indirect determination of the relative amount of L-capture. An L/K capture ratio of 0.10 ± 0.05 has been found in this manner, in good agreement with the theoretical ratio and with the value of 0.128, reported by Drever and Moljk³ while the present work was in progress.

II. Search for a 255-kev gamma ray from tin-113
Conversion electrons from a feeble gamma ray of 255
kev following electron capture of Sn¹¹³ have been reported
by one group of workers⁴ but were not found by others.
An attempt to detect this gamma ray with a scintillation
spectrometer has been made. In order to reduce the
Compton continuum which ordinarily masks the region of
the spectrum where this gamma ray would appear, an
anti-coincidence Compton shield has been constructed.
The shield consists of a 4-liter liquid scintillator and reduces the Compton edge by 13%, without revealing the
questionable gamma ray. On the basis of data obtained
with the shield, design characteristics for a larger, more
efficient and much more costly shield are suggested.

Microfilm \$2.00; Xerox \$4.80. 91 pages.

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- 4. Cork, Stoddard, Branyans, Childs, Martin, and LeBlanc, Phys. Rev. 84. 596 (1951).

THE TRANSVERSE POLARIZATION OF BETA PARTICLES EMITTED FROM Au¹⁹⁸

(L. C. Card No. Mic 58-7995)

Paul Colbert Simms, Ph.D. Purdue University, 1958

Major Professor: R. M. Steffen

As a consequence of the nonconservation of parity, electrons emitted in first forbidden beta transitions can exhibit a small degree of polarization transverse to their momentum. The polarization is defined with respect to a plane which is introduced into the problem by observing the direction of emission of the electron and the direction of emission of a gamma ray following the beta transition. Then there is a component P_{\parallel} of the polarization perpendicular and a component P_{\parallel} parallel to the beta-gamma plane.

In this experiment, a beta polarization-gamma directional correlation was measured for $\mathrm{Au^{198}}$. The beta detector was made polarization sensitive by observing electrons that were scattered from a thin gold foil, and the presence of $\mathrm{P_{||}}$ was established:

$$P_{||} = -0.013 \pm 0.010$$

This result gives very conclusive evidence that the Vector and Axial Vector interactions are responsible for beta decay.

It had been proposed that time reversal invariance in beta decay could be investigated by measuring P_{\parallel} . A theoretical discussion and experimental evidence are given which show that this is not a practical method for investigating time reversal.

Microfilm \$2.30; Xerox \$8.00. 174 pages.

OBSERVATION OF THE REACTION $\pi^{+} + p \longrightarrow \Sigma^{+} + K^{+}$

(L. C. Card No. Mic 58-3741)

John Christian Vander Velde, Ph.D. University of Michigan, 1958

In recent years there has been a great deal of research devoted to investigating the so-called strange particles. The bubble chamber has proved to be a very useful device in the study of the tracks of these particles, from which an analysis of their types and properties can be made. High energy beams of negative pi mesons from the Cosmotron at Brookhaven National Laboratory have been used

extensively in this type of work and the reactors $\pi^- + p$ $\Sigma^- + K^+$ and $\pi^- + p \longrightarrow \Sigma^0 + K^0$ have been well-established. The production of a π^- beam is facilitated by the fact that the negative mesons can be separated magnetically from the protons which produced them, but a π^+ beam will, in general, have a high proton contamination. Recently it became possible, at the Cosmotron, to reduce this contamination to a point at which a bubble chamber experiment could be efficiently performed. The purpose of the present experiment was to place the University of Michigan twelveinch propane bubble chamber in this beam in order to study the possible existence of the reaction $\pi^- + p \longrightarrow \Sigma^+ + K^+$. A 1.23 Bev/c beam of positive particles was set up in which the proton to pion ratio was 1.75. There was a small muon contamination representing about 8% of the pions. 22,000 exposures were made and the pictures were scanned specifically for the above reaction. Nineteen such events were identified by kinematics as occurring on free protons in the propane. In all the events the Σ^+ decayed in the chamber, and in five cases the K⁺ stopped and decayed in the chamber, affording an additional check on the reaction kinematics and the incident beam momentum. There were fourteen decays of the type $\Sigma^+ \rightarrow \pi^+ + n$ and five of the type $\Sigma^+ \rightarrow \pi^0 + p$. There was a definite scanning bias against the proton decay mode (because of the small laboratory decay angle of the proton) which can account for the relatively small number of this type of event.

After taking into account scanning efficiencies and other lesser effects, the total production cross section for the process $\pi^+ + p \longrightarrow \Sigma^+ + K^+$ was found to be .15 \pm .05 mb. The differential production cross section is strongly peaked forward with all nineteen events occurring at Σ^+ center-of-mass production angles of less than 120°. Upon comparing these results with those from a similar π^- experiment at the same energy, it is found that the total cross sections are in agreement with the hypothesis of charge independence in the production processes. The differential cross sections, however, show an inconsistency with this hypothesis.

The angular correlations between the production and decay planes of the Σ^+ were examined in regard to the questions of high spin or parity doublets for the Σ^+ , or the non-conservation of parity in its decay. No significant deviations from isotropy were found so that no conclusions could be drawn.

A maximum likelihood technique was used to determine the value for the Σ^+ mean lifetime which gave the best fit to the data. This was found to be

$$\tau(\Sigma^+) = (0.95^{+0.37}_{-0.23}) \times 10^{-10} \text{ sec}$$

The errors come from the width of the likelihood function at half maximum.

Microfilm \$2.00; Xerox \$3.50. 60 pages.

PHYSIOLOGY

THE MECHANISM OF INSULIN RESISTANCE IN AN INBRED STRAIN OF MICE

(L. C. Card No. Mic 58-7207)

Bertie F. Argyris, Ph.D. Syracuse University, 1958

This study is concerned with the mechanism of insulin resistance in a strain of mice (KL). These mice tolerate from 300-500 units of insulin without going into convulsions. The control Swiss and BUB mice convulse after 10-20 and 40-50 units respectively.

The insulin resistance of the KL mice can not be explained on the basis of a resistance to convulsions in general, for the sensitivity of the KL mice to the convulsive agent Metrazol is similar to that of control animals. In vitro and in vivo insulin degradation studies indicate that the KL mice do not inactivate insulin at a faster rate than the control animals. Although they tolerate extremely large doses of exogenous insulin, the amount of extractable insulin in the KL pancreas is within normal range. Blood sugar levels and glucose tolerance of the KL mouse are also normal.

Insulin does have a blood sugar lowering effect in the KL mouse. After injection of one unit of insulin into fed animals, the blood sugar drops and returns to normal within 4 hours, but after 200 units the blood sugar remains at a low level for 20-28 hours.

Our studies are centered around the mechanisms by which the KL animal can maintain the blood sugar just above convulsive levels after large doses of insulin. First of all, the glycogen content of the KL liver is twice as large as in the BUB mouse. These stores are depleted at the onset of insulin-induced convulsions. But higher liver glycogen stores by themselves can not explain the insulin resistance completely, for in the absence of an outside food source the KL mice lose their resistance completely and convulse after very small doses of insulin.

The KL mouse is capable of maintaining a normal food intake after insulin and in addition it can absorb the ingested food at a higher rate and thus counter-balance the insulin-induced hypoglycemia. The control Swiss mouse shows a lower rate of intestinal absorption and is thus incapable of restoring the low blood sugar levels fast enough. The control BUB animal is capable of absorbing food at the same rate as the KL mouse, but these animals decrease their food intake after insulin administration, thus lower their available glucose source and go into insulin shock.

The importance of food intake and intestinal absorption in the determination of insulin sensitivity is also supported by the observations that the control mice show a marked increase in insulin resistance when placed on a synthetic diet, which is more accessible and digestible than Purina Chow pellets. The Swiss mice tolerate 100 units of insulin under these conditions and their food intake is high.

The KL mice lose their insulin resistance completely when placed under stress, even in the presence of food. This loss of insulin resistance is not due to a decreased food intake. These observations, in addition to the histological findings of necrosis and cortical vacuolization in the cortex of the KL adrenal gland, may inplicate the adrenal as an additional factor, important in the insulin resistance of the KL mouse.

Microfilm \$2.00. Xerox \$7.00. 149 pages.

THE EFFECTS OF CARDIAC WORK ON THE GLYCOGEN FRACTIONS OF LEFT VENTRICULAR MYOCARDIUM

(L. C. Card No. Mic 58-7439)

Don Houston Blount, Ph.D. University of Missouri, 1958

Supervisor: Dallas K. Meyer

The present study involved the analysis of the two glycogen fractions of the left ventricle under a variety of experimental conditions aimed at increasing cardiac work in albino rats. Two methods of increasing the work load on the left ventricle of the intact animal were used. The first method was to increase peripheral resistance by coarctation of the abdominal aorta for periods of one hour to five days. Ligation of the abdominal aorta was also performed for a period of one hour. With increased peripheral resistance for a five day period, hypertension resulted. No changes in the concentration of the glycogen fractions were seen in the hypertrophied left ventricle. Injections of C¹⁴D-glucose revealed a possible decreased glucose uptake in the TCA fraction of the hypertrophied heart. This may be explained on the basis of an effective decrease in the circulation of the hypertrophied heart. Decreased cardiac output and increased peripheral resistance for one hour by coarctation failed to reveal any significant changes in the glycogen fractions. Ligation for one hour resulted in a significant increase in TCA glycogen. The mechanism of this increase is unexplained.

Increased cardiac output and decreased peripheral resistance by swimming exercise depleted both glycogen fractions. A greater decrease was seen in the TCA or unbound fraction. A direct relationship exists between duration of exercise stress and depletion of cardiac glycogen. However, the relationship is not a linear one. Left ventricular glycogen was not significantly different when fifteen minutes and one hour time intervals of exercise were compared. Apparently the heart was capable of utilizing other substrates for energy after fifteen minutes of exercise.

Glycogen resynthesis in both fractions was complete after one hour of rest from exercise. The TCA fraction

is elevated significantly at this time. The mechanism by which this is accomplished is not known at present.

The method of sacrificing the animal affected the glycogen content of myocardial tissue. A significantly elevated TCA fraction resulted when sodium pentobarbital was used. Since struggle at time of sacrifice appeared to have little effect on the glycogen fractions, there is a possibility that sodium pentobarbital anesthesia may result in glycogen deposition in the heart.

The TCA glycogen fraction of the left ventricle was more affected than the residual fraction by the various experimental procedures used. The unavoidable conclusion must be made that the TCA or unbound fraction of glycogen is truly the more labile form of stored carbohydrate.

Microfilm \$2.00; Xerox \$5.60. 112 pages.

"RE-SETTING" A BIOLOGICAL CLOCK

(L. C. Card No. Mic 58-7825)

John Ely Burchard, Jr., Ph.D. Princeton University, 1958

When an organism is exposed to a single light period, or artificial day, at a time out of phase with its endogenous rhythm or "clock," this clock may be "re-set" to or toward the time indicated by the new signal. Experiments of this type have been reported by Pittendrigh and Bruce (1957) and are described and discussed in more detail here as a basis for comparison with the behavior of another, very distantly related organism, the golden hamster Cricetus auratus (Waterhouse). In general both organisms respond by temporary slowing of the internal rhythm, bringing about a phase retardation, when the signals begin during that part of their internal cycle corresponding to daytime, and often to the first few hours of the night as well. Signals coming during the later part of the night, on the other hand, accelerate the rhythm, thus advancing the phase to an earlier position than before.

A fairly definite "watershed" or division point can be located between these two types of response; its location is later in the internal cycle for 4-hour than for 12-hour signals, in both organisms, and is later for 50-lux than for 500-lux signals in the hamster. When the 4-hour signals begin during the first 8 hours of the internal "day," so that all the light comes at an "appropriate" time, both organisms seem to show much less response than when some of the light falls within the internal "night" phase. Finally, at times both organisms appear unresponseive to signals falling in a narrow region located at the division point between the "long-period" and "short-period" types of re-setting response.

In spite of this remarkable overall similarity there are important quantative differences. Phase shifts in the hamster are rarely large enough to bring the animal to the "correct" phase relation to the new signal; in Drosophila, with certain important exceptions, all the cultures come to a particular phase with reference to any given signal. Besides being of smaller magnitude, the transients in the hamster tend to last longer, especially the short-period

ones. The shift in division point, with 4-hour as compared with 12-hour signals, is also somewhat less in the hamster than in the fly. All of these effects could, in the present state of our knowledge of the mechanisms involved, be due to differences in the physiological apparatus by which light-given information is received and relayed to the rhythmic center, equally as well as to any difference in the mechanism of that center.

The comparison, with its far-reaching similarities, is interpreted as very encouraging to the hypothesis that the underlying time-keeping machinery of these two forms may be fundamentally the same. Thus it reinforces the idea of a well-nigh universal mechanism for biological time-measurement, which is probably of very ancient origin in the history of life.

Microfilm \$2.00; Xerox \$5.20. 101 pages.

ANATOMICAL AND PHYSIOLOGICAL EFFECTS OF RAPID DECELERATION

(L. C. Card No. Mic 58-732)

Alfred Francis Fasola, Ph.D. The Ohio State University, 1953

The advent of modern high speed transportation has brought into extensive use many types of restraining devices intended to prevent bodily injury from high peak decelerative forces of short duration. Man's interest in travel in the upper atmosphere and in space itself with reasonable assurance of safe return also has introduced problems in which the tolerance of the body, anatomical as well as physiological, must be known.

The present investigation has been undertaken primarily in response to the request of safety engineers who are in need of information concerning the strength of the human skeleton and the effects upon it of rapid deceleration produced by safety devices.

Our investigation of morphological damage and the force required to produce it has been done by testing the strength of the structures that comprise the pelvic girdle inclusive of the acetabulae and femurs. This has been done by analysis of the ultimate breaking strength of bones, isolated and in the intact state, and of a series of bones, ligaments, and muscles which comprise the joint. Tests have been conducted in both static and dynamic conditions on unembalmed human cadaver materials. Results of these tests are as follows: -

JOINT	ULTIMATE BREAKING STRENGTH		
Sacroiliac	1925-lbs. (static)		
Sacroiliac (dry sample)	270-lbs. (dynamic)		
Femur (without cast)	2000-lbs. (static)		
Femur (with cast)	1600-lbs. (static)		

Middle of shaft of femur	1700-lbs. (static)
Clavicle (human)	230-lbs. (static)
Clavicle (model)	260-lbs. (static)
Inferior surface of neck of Femur (denuded of muscles)	600-lbs. (dynamic)
Inferior surface of neck of Femur (intact)	7500-lbs. (dynamic)
Symphysis Pubis	595-lbs. (dynamic)
Sacroiliac joint completely intact	830-lbs. (dynamic)
Lateral wall of acetabulum	800-lbs. (dynamic)
Tests on posterior and anterio	or wall of pelvic ring:
Sacroiliac (intact)	775-lbs. (dynamic)
Symphysis pubis with interrupted posterior wall	350-lbs. (dynamic)
Symphysis pubis	595-lbs. (dynamic)
Sacroiliac joint with interrupted anterior wall	480-lbs. (dynamic)

Detailed methods of applying force and resulting fractures have been described for all structures. In the intact condition, fractures of the femurs do not occur when the force is applied by cables to the inferior surface of the neck of the femur or when it is applied to the base of the sacrum. Fractures of the lateral wall of the pelvis and acetabulum do not produce fractures or disjunction of the sacroiliac joint. The strength of the pelvic ring is directly related to the strength of the anterior and posterior wall; thus the strength of these walls must be known to correctly ascertain the inherent strength of the entire pelvic ring. Primary fractures of the pubicramus, unilateral or bilateral, produce secondary fractures or disjunction of the sacroiliac joint by disrupting the integrity of the counterarch of the pelvis. The counterarch is, therefore, the important factor in maintaining the inherent strength of the pelvis for the reason that it ties anteriorly the weight-bearing arches that are confluent with the sacrum.

Previous data from this laboratory (Joffee,110) show that congestion of the lungs interpreted as congestive heart failure is the primary result of deceleration into abdominal safety belts. By high speed x-rays taken at the rate of 50 frames per second at the instant of deceleration, we have described a possible mechanism for the cardiac failure produced by Joffee.

These experiments suggest that the mechanism by which cardiac damage is produced in rapid deceleration involves the action of the belt in suddenly blocking blood flow in the abdomen, both in the venacava and the abdominal aorta. Since the flow of blood from the upper region

of the body is toward the heart, the effect produced is similar to that of a closed liquid system subjected to a force from below and above. Therefore, the heart is squeezed between these two forces and is stretched in the transverse direction. This phenomenon is analogous to the deformation of a water-filled rubber balloon which is suddenly and forcibly deformed by forces acting from below and above. In these experiments, the changes noted either diminished or completely disappeared within a fraction of a second after the force was applied. Even so, it is possible that this force might produce cardiac pathology by momentarily stretching the muscle beyond its limit of extensibility. Furthermore, it is likely that higher forces of deceleration might result in permanent deformation of myocardium.

A third phase of investigation was undertaken to determine the tolerance of dogs to rapid deceleration with force applied to the region of the ribs by abdominal safety belts. Final conclusions on this phase must be deferred because it has not been possible with the existing apparatus to deliver enough force under free fall conditions to produce permanent damage to the skeleton or the visceral organs.

Nevertheless, some minor but definite damage was noted to the heart, liver, and kidney at 56 "g" measured at the level of the fourth rib. Histological examination of these organs revealed hemorrhage in myocardium, subcapsular hemorrhage of liver, and in one case a general congestion of the interlobar vessels of the cortex.

Though the heart, by virtue of its position, is particularly vulnerable to violence, the liver and kidney may also be included as areas in which damage may be produced.

Microfilm \$2.00; Xerox \$6.80. 144 pages.

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STUDIES ON THE MECHANISM OF TOLBUTAMIDE-INDUCED HYPOGLYCEMIA

(L. C. Card No. Mic 58-2971)

John Edward Klimas Jr., Ph.D. State University of Iowa, 1958

Chairman: Associate Professor Gordon W. Searle

It has been established that certain sulfonylureas are effective in lowering the blood sugar in man and animals. However, the mechanism by which this hypoglycemia is produced has not, as yet, been clarified. This dissertation was an investigation of some of the proposed modes of action of these compounds using tolbutamide, the sulfonamide derivative marketed under the tradename, Orinase, by the Upjohn Company.

Four possible mechanisms of action were studied. The first involved the proposition that tolbutamide might cause hypoglycemia by inhibiting the production of glucagon. This does not appear to be the case since tolbutamide was ineffective in lowering the blood sugar of severely alloxan diabetic rats. Tolbutamide was also found to have no demonstrable effect on the morphology of the alpha cells of the pancreas, the supposed site of glucagon production.

The second possible mechanism involved whether or not tolbutamide causes hypoglycemia by inhibiting the insulinase system. This was tested by an experiment to determine if tolbutamide would prolong the action of exogenous insulin in severely diabetic animals. Tolbutamide appeared to be ineffective in reinforcing the action of known quantitaties of insulin under these conditions.

The third possible action of tolbutamide investigated concerned the hypothesis that tolbutamide causes a general lowering of the blood sugar by inhibiting the absorption of glucose. However, tolbutamide had no demonstrable effect on the absorption of glucose from an acute loop preparation of the small intestine of the rat.

The fourth pathway considered for tolbutamide effect was the suggestion that tolbutamide causes hypoglycemia by stimulating the beta cells to release insulin. Positive evidence for this mode of action was first noticed when tolbutamide was found to be effective in lowering the blood sugar of mildly diabetic rats but to be without effect on the blood sugar of severely diabetic rats. Histologic evidence also added positive support to this proposed mode of action when it was noted that on prolonged treatment tolbutamide caused a marked degranulation of the insulinproducing beta cells of the pancreas in most of the animals studied. It was found that animals on prolonged treatment with tolbutamide handled a glucose load less efficiently, as measured by glucose tolerance tests, than animals given a single dose of the drug. Finally, it was found that prolonged pretreatment with tolbutamide altered the triphasic response of rats to an injection of alloxan monohydrate in two ways, (a) it caused a more severe and prolonged initial hyperglycemia, and, (b) in some instances there was no transient secondary hypoglycemia prior to the third phase of permanent diabetes. Both these alterations seem to indicate some degree of beta cell degranulation on prolonged tolbutamide treatment and, hence, an insulin release in response to the drug.

Microfilm \$2.00; Xerox \$5.40. 106 pages.

EPINEPHRINE TACHYPHYLAXIS

(L. C. Card No. Mic 59-643)

Peter Robin Lynch, Ph.D. Temple University, 1958

Amarin (2:4:5-triphenyldihydroiminazotle) sensitizes the myocardium of a dog to subsequent intravenous injections of epinephrine which produce fatal ventricular fibrillation. Mephentermine and ephedrine demonstrated antifibrillatory properties under the conditions of these experiments. The heart at necropsy was abnormally dilated. A second injection of epinephrine at this time would produce a smaller response in blood pressure even if the dose of the second injection exceeded that of the initial injection. The respiratory rate however, was decreased to a greater extent after the second larger dose even though the blood pressure response was decreased.

A series of experiments were performed in order to demonstrate the mechanical antifibrillatory properties of

a cardiac tamponade. An amarin injection was followed by the production of a cardiac tamponade. After this a dose of epinephrine, which normally produced ventricular fibrillation, was injected into the cavity of the left ventricle. The production of a cardiac tamponade inhibited ventricular ectopic rhythms, including ventricular fibrillation.

A third series of experiments demonstrated the existence of an epinephrine tachyphylaxis. The response of the animal to a large (1.0 mgm per kgm.) dose of epinephrine, produced a rapid increase in blood pressure, tachycardia and many multifocal ectopic rhythms. The response to subsequent doses is different. Often the second or third large injection of epinephrine produced no change in blood pressure or the electrocardiographic tracing.

However, pressor and respiratory actions of epiinphrine can be separated. The respiratory responses
persisted when pressor activity was decreased or completely absent following a large injection of epinephrine.
Subsequent to a very large dose of epinephrine the expected
cardiovascular and electrocardiographic responses of
1-norepinephrine, pituitrin and serotonin (5-hydroxytroptamine) did not appear. This is evidence of cross tachyphylaxis.

After an animal had received a large injection of epinephrine good evidence was obtained that an active epinephrine-like substance (E.L.S.) is present in the plasma even though the blood pressure returns to normal control levels. Plasma was removed from an animal a half hour after it had received a "massive" injection of epinephrine. When this was injected into another animal it produced a rapid increase in blood pressure. This was demonstrated to be due to the presense of a pressor substance in the plasma. The volume of injection was controlled. After small injections of epinephrine chemical determinations were made of an epinephrine-like substance (E.L.S.) in the plasma. Although blood pressure returned to normal it was observed that E.L.S. was still increased. Also there was evidence of an accumulation of the E.L.S. when injections of epinephrine follow in relatively close order. These findings leave in question the concept that the return to normal of the blood pressure after an injection of epinephrine is due to the inactivation of the drug. Epinephrine exhibited a tachypylaxis similar to that observed in irreversible secondary surgical shock where it will not elevate blood pressure.

Microfilm \$2.00; Xerox \$5.00. 97 pages.

THE THYROXINE SECRETION RATE OF DOMESTIC ANIMALS UTILIZING RADIOACTIVE IODINE AS A TRACER

(L. C. Card No. Mic 58-7449)

Bhartur Narasimhaiengar Premachandra, Ph.D. University of Missouri, 1958

Supervisor: Charles W. Turner

The importance of the thyroid gland (and its hormone, thyroxine) in relation to reproduction and growth

processes and in maintaining the intensity of milk secretion is well known. The thyroid hormone acts essentially as a regulator of cellular oxidation.

However, until recently, the methods for determining the thyroxine secretion rate were crude and indirect or involved the sacrifice of the animals by groups which permitted only an average value. A technique, therefore, was explored and has been developed which makes possible the study of quantitative changes in thyroidal-I¹³¹ with convenience and accuracy. Replacement therapy with thyroxine during thiouracil treatment indicated the feasibility of measuring the actual daily thyroxine secretion rate of individual animals in terms of L-thyroxine.

Employing this technique, a number of individual estimations of thyroxine secretion rates were made in cows and calves throughout the year. The average thyroxine secretion rate for the cows was 0.56 mg. (range 0.2-1.0) L-thyroxine/100 lbs. body weight in winter and 0.6 mg. (range 0.2-1.0) L-thyroxine/100 lbs. body weight for the

calves during the same period.

A ten-fold individual variation in the thyroxine secretion rate of the cattle was noted in the winter season. With increasing ambient temperature (summer season) thyroxine secretion rates were reduced three-fold but the extent of depression varied with the individual. There was an average three-fold variation in thyroxine secretion rate between individuals during the same season. Along with thyroxine secretion rates, the rate constants for hormone discharge from the thyroid were also determined in various animals throughout the year, but the relationship of thyroxine secretion rates with hormonal release rates was rather poor which is believed to be due to the variation in the size of the thyroid gland with identical or different release rates.

The T_2^1 of labeled thyroxine ranged from 2.0 to 2.75 days in plasma which indicated a rapid disappearance of thyroxine in blood. Also, the experimental findings with thyroprotein revealed that the oral effectiveness of thyroxine contained in thyroprotein was about 10% as effective as subcutaneous thyroxine administration.

With a sound technique for measuring in vivo thyroidal-I¹³¹ being available, a preliminary study was made of the influence of normal internal environment of the dairy cow (which would include changes such as estrous cycles, pregnancy and lactation) on thyroid function during reproduction. It was observed that estrogen at the level required to initiate milk secretion increased the thyroxine discharge rate. A similar, but slight effect was noticed with some of the adrenal hormones also. It is known that both estrogen and adrenal hormones are secreted in increased amounts during late pregnancy and parturition. It is possible, therefore, that an independent or synergistic stimulating effect of these two hormones might cause the increased secretion of thyrotropin and thyroxine at the time of late pregnancy and parturition to influence the intensity of milk secretion.

A modification of the technique adopted for cattle permitted the determination of thyroxine secretion rate in the individual fowl. Two strains of New Hampshire chickens selected for several generations on the basis of thyroid enlargement during goitrogen administration exhibited marked differences in thyroxine secretion rates. The strain showing a marked response to thiouracil secreted an average of 1.02 micrograms L-thyroxine per 100 grams

body weight of the bird, whereas the strain showing little response had a secretion rate of 2.98 micrograms L-thyroxine per 100 grams body weight of the bird. The hormone release rate constants were not properly correlated with thyroxine secretion rates of the bird.

From the results on cattle and poultry, it is concluded that the estimation of thyroxine secretion rate is the best index of thyroid function.

Microfilm \$2.30; Xerox \$8.00. 175 pages.

EFFECT OF GOITROGENIC MATERIALS ON THYROIDAL ACTIVITY AND FEEDLOT PERFORMANCE OF RUMINANTS

(L. C. Card No. Mic 58-7579)

Arthur Phillip Raun, Ph.D. Iowa State College, 1958

Supervisor: Wise Burroughs

Studies were conducted with cattle and sheep to determine the effect of goitrogenic compounds (thiouracil and 1-methyl-2-mercapto imidiazole or Tapazole) on thyroid activity, metabolic rate and feedlot performance of animals as well as the quality of the carcasses produced.

Thyroid activity was evaluated on the basis of weight of the thyroid gland and also by two techniques involving radioactive iodine. Metabolic rate was determined on lambs with a carbon dioxide absorption apparatus. Feedlot performance was based on rate and economy of gain and feed consumption; while carcass quality was based on Federal carcass grade, dressing percent, rib eye muscle area, thickness of fat over rib eye, separation of bone, fat and lean from rib sections and ether extract in lean tissue.

Prolonged oral administration of thiouracil to eight steers at levels ranging from 1 to 20 grams per day had no effect on thyroid activity or carcass quality while feed-lot performance was depressed only by the high level of thiouracil. Thiouracil was observed to be unpalatable at the higher levels.

Tapazole was observed to alter thyroid activity in lambs receiving from 4 to 128 mg. per day, while no effect on metabolic rate was observed. Tapazole consistently and progressively altered thyroid activity at levels from 200 to 1,200 mg. per day in steers on the basis of both iodine elimination rate from the thyroid and thyroid weight.

Tapazole was found to be beneficial in promoting rate of gain of steers in feeding periods of 79 and 134 days and evidenced no effect over a 176-day feeding period. Tapazole increased economy of gains in every case and resulted in somewhat reduced feed consumption over the longer feeding period.

Carcass quality was slightly improved in every case with Tapazole administration as evidenced by higher carcass grades, higher percent separable fat in the rib sections and a higher percent ether extract in rib eye muscle of the treated animals.

Tapazole increased the weight of the pituitary glands of steers as well as the amount of growth and thyrotropic hormone contained in the gland.

From these experiments Tapazole appears to be an effective oral goitrogen which promotes superior gain in steers, increased economy of gain, and improved carcass quality over all feeding periods. Optimum daily dosage of Tapazole as an aid in fattening cattle appears to lie between 300 and 600 mg.

Microfilm \$2.20; Xerox \$7.80. 166 pages.

THE APPLICATION OF CERTAIN METHODS FOR THE DETERMINATION OF THE PRESENCE OF PAIN IN THE DOG DURING DECOMPRESSION

(L. C. Card No. Mic 58-7580)

Russell Levoy Schelkopf, Ph.D. Iowa State College, 1958

Supervisor: E. A. Hewitt

The purpose of this preliminary investigation was to determine if pain is perceived during decompression. An experiment was designed to determine the pain reaction threshold in 15 dogs with the Hardy-Wolff-Goodell Dolorimeter. A total of 875 pain reaction thresholds were recorded with the dolorimeter applied to the integument of shoulder and lumbar areas. The application of a thermal stimulus to the shoulder area resulted in a sudden lateral movement of the head and this pain reaction threshold revealed an over-all mean of 241.6 mc./cm.²/sec. When radiant heat was applied to the dorsal lumbar region of the dog, a characteristic muscle twitch was often observed. An over-all mean of 241.6 mc./cm.²/sec. for this pain reaction threshold was observed.

Seven hundred pain reaction thresholds were recorded at various decompression levels on ten dogs when the Hardy-Wolff-Goodell Dolorimeter was applied to the shoulder and lumbar areas. The pain reaction thresholds were obtained at 734.4 (average barometric pressure at Iowa State College), 582.0, 429.6, 277.2 and 124.8 mm. of Hg. A small increase in the pain reaction threshold of 9.4 and 11.9 mc./cm.²/sec. was recorded in the over-all means from 734.4 mm. of Hg. to 124.8 mm. of Hg. when the thermal stimulus was applied to the shoulder area and lumbar area, respectively.

A total of 200 observations was recorded on 10 teeth of five dogs when an electrical stimulator was applied to metal fillings in the canine tooth. A wide average range of 25.26 to 42.09 volts was observed in the pain reaction thresholds on the left canine tooth and an average range of 30.01 to 42.50 volts was recorded on the opposite canine tooth. A very high standard deviation (4.58) indicated the lack of reproducibility of the pain reaction thresholds by electrical stimulation of the canine tooth.

The injection of 1 mg./kg. of morphine increased the pain reaction thresholds 34.5 per cent and 25.4 per cent when the dolorimeter was applied to the shoulder and lumbar region respectively. Since morphine decreased the excitement and apprehension before decompression, it appears that little or no emphasis can be attributed to the observation that the experimental animals exhibited less excitement during decompression post-morphinization.

The bilateral sectioning of certain lateral spinal tracts of the dog markedly decreased pain sensitivity and alleviated pain reaction due to mechanical stimulation caudal to the shoulder in 5 animals. There appeared to be little or no change in anxiety and excitement during decompression following the bilateral sectioning of certain spinal tracts.

The results in this research are not sufficiently definite to conclude whether or not animals suffer pain during decompression.

Microfilm \$2.00; Xerox \$6.20. 130 pages.

POLITICAL SCIENCE

POLITICAL SCIENCE, GENERAL

A STUDY OF DESCRIPTIVE PLATONIC POLITICS

(L. C. Card No. Mic 58-7837)

Morris Davis, Ph.D. Princeton University, 1958

Most studies of Platonic political theory emphasize history, biography, ethics, and metaphysics; this dissertation concentrates exclusively on the descriptions of three projected cities that occur in the Republic, the Politicus, and the Laws. It treats these three dialogues as a species of imaginative anthropological reporting. In so doing, it seeks not only to elucidate the details of the cities described, but also to uncover the foci and biases of the descriptions themselves.

As for the details of the three cities, separate sections in the chapters on the Republic and the Laws discuss their multifold origins, the place and conditions of non-elites or of non-citizens in the cities, the biological and social controls that obtain among the rulers or the citizens and the governmental machinery that enforces them, the ends of permanence and unity that these controls are to produce, and the dangers that may thwart these ends. The three cities are treated separately since, because of overt differences and of areas that the various foci leave unilluminated, it is uncritical to combine data from the three dialogues into an account of the Platonic polis. Because the Laws gives so much information on these items, its discussion is much longer than that of the Republic. The account of the Politicus treats these subjects in analogous but necessarily more abbreviated fashion.

This aspect of the paper differs from other works on Platonic politics not in discussing these topics at all, but in considering them in greater detail, and without importing historical analogies that may not be pertinent, pressing incidental remarks beyond their contextual meanings, or trying to acquit or convict Plato of advocating a policy that offends this writer's tastes in goodness and utility. In addition, some conclusions in the thesis about the cities differ radically from those current in critical literature. For example, it is shown that neither the place of law nor its degree of permanence differs demonstrably among the three cities, and that it is especially inaccurate to talk of the absence of law in the Republic and its re-acceptance in the Laws.

More novel is the consideration of the descriptions themselves of the three cities. It is shown that each of the dialogues focuses on a different part of politics, and that these different foci are quite sufficient to account for most of the alleged changes of political doctrine. For the Republic the focus--as a methodological comparative examination of the decline of the state proves--is almost exclusively on the governing elites. In the Politicus the emphasis is on the mechanics of public administration and on the logical distinction of tasks within the polity. The

Laws for its part demonstrates a triple focus: on the belief systems, the social relations, and the formal legal organization in a total society; and this unfortunately diminishes the value in evidence of its details.

These three foci are shown themselves to depend on the encasing topics within which the political descriptions occur. They are shown not to depend on Platonic esoterica about ontology, epistemology, or linguistics. The dissertation also points up the biases that the dialogue form allows for, such as errors made by respondents that are subsequently corrected and interference by participants in the dialogue in the cities that they are logically only describing. It shows that correct interpretations of the Republic and the Laws depend on making allowances especially for the latter, and of the Politicus especially for the former. Microfilm \$7.25; Xerox \$25.20. 569 pages.

STATUS ATTITUDES OF CITY COUNCILMEN: A CASE STUDY OF THE SYRACUSE, NEW YORK CITY COUNCILMEN

(L. C. Card No. Mic 58-2301)

Lyle Macdonald Hansen, D.S.S. Syracuse University, 1958

Supervisor: Roy A. Price

The purpose of this study is to determine, analyze, and describe the status, or social role, conceptions of city councilmen in order to penetrate, describe, and understand one segment of the urban political process. Status is conceived as the activities expected of a position in a pattern of institutionalized social behavior. Status, or social role, is distinguished from the personal activities of an incumbent who occupies such a status, and constitutes the personal role.

The participant's attitudes (expectations or norms) towards that status as distinguished from their status activities are the central object of study. The concept of status utilized here is related to that developed by Kingsley Davis. The status of city councilman in the political process is the major conceptual object of study, and is related to the formulation of the political process developed by Oliver Garceau.

The study consisted of discerning the status attitudes held by city councilmen towards the status of councilmen. The data consisted primarily of the responses from intensive interviews of thirty councilmen from the city of Syracuse, New York, who were incumbents in the years 1942 to 1952. The interview was aided by a schedule of four fixed free response items plus classificatory items. The responses were analyzed by means of an inductive classification method. Selected aspects of the Syracuse situation are also presented as in the city wide election and council voting patterns.

The findings indicated that these Syracuse councilmen expect city councilmen to engage in a range of six kinds or classes of activities. These are 1) activities of councilmen primarily as councilmen alone or with each other; 2) activities primarily involving the council's procedures as in caucus, committee, and public meetings; 3) activities involving organized political groups as in the political parties or citizen organizations; 4) activities with unorganized constituents as in facilitating requests for services; 5) activities primarily involving the governmental policy process; 6) and activities in achieving council office. The last named class was held residual.

Responses of councilmen were analyzed to determine what, in the range of activities indicated, was the focus of interest of these respondents. Three different criteria derived from the classification system were utilized for this analysis, and resulted in the grouping of the respondents into seventeen quasi-type perception groups.

The status attitudes (norms) held by these respondents to each of the classes of activities were determined and described. The resulting patterns of attitudes were analyzed in terms of the focus of interest groups, and twelve social-political-economic characteristics of the respondents. The results were presented in the form of forty-six hypotheses as to the attitudes of city councilmen to the status of city councilmen. These findings indicated that these councilmen hold institutionalized attitudes to the status of councilmen, but they individually vary in how they conceive of this status. They hold both public and private status attitudes. The patterns of status attitudes indicated, after analysis, that they were influenced by the operation of several factors. These included 1) the influence of the council as a small social group which operates to minimize individual interests and allegiances while enhancing the reputation and cohesion of the group, 2) the influence of the political party groups and personnel as in organizing and conducting the council's business on party lines with regular consultation between councilmen and party personnel, 3) the legal structure of the city government which influences the councilmen's expectations regarding their functions in the policy process, 4) and certain personal characteristics which are related to individual deviance from the council majority, or which make some councilmen more cognizant and solicitous of the interests of political groupings in their constituencies.

THE STRUCTURE OF ORGANIZATION AND POWER IN CANADIAN POLITICAL PARTIES:
A STUDY IN PARTY FINANCING

Microfilm \$3.20; Xerox \$11.00. 247 pages.

(L. C. Card No. Mic 58-5947)

Ernest Eugene Harrill, Ph.D. The University of North Carolina, 1958

Supervisor: George Alexander Heard

Political parties in the United States are generally described as loose coalitions of state political organizations, with very little power centered in the national organization of the parties. This type of organization has been attributed variously to federalism and/or the presidential type of government.

Comparison between the political parties of the United States and those of other states depends on the information available concerning political parties in the other states. Canada suggests itself as a desirable basis of comparison for several reasons. While federal in form, it has a parliamentary arrangement of executive-legislative relationships. If these two features of governmental organization are influential on the types of party organization adopted, Canada offers a case study where federalism is in operation but a presidential system is not. Information on Canadian political party organization and processes may thus prove useful for the study of political parties and comparative government.

Given that money is a valid and essential element in the operation of a political party in a democratic state, it was concluded that a study of the sources, collections, handling, and disbursement of party finances in Canada might cast new light upon the operating organization and activities of Canadian political parties. It was not thought that the flow of money necessarily determined the structure of power within the parties, but that the flow of money into, through, and from the parties would make more apparent the existing situation.

Two hypotheses provided the framework for the study. The major hypothesis was that the flow of money in the four major national political parties of Canada would disclose a much more centralized control within the party than had generally been attributed to the Canadian parties. A subsidiary hypothesis was that the major source of income for the Canadian parties was the business community, which was largely national in its activities and interests.

One conclusion is that the Liberal and Conservative national organizations do derive the major portion of their finances from the business world. The Co-operative Commonwealth Federation, however, receives most of its income from the provincial organizations of the party, which in turn depend on small individual contributions and portions of the organized labor movement. The Social Credit national organization depends largely on the Alberta and British Columbia provincial organizations for its finances.

The conclusion on the major hypothesis is that the national organizations are the Liberals and the Conservatives are largely separated from the provincial organizations of the same parties. In a national election, the national organization collects its own funds, handles them, and disburses them through its own agents and not through provincial officials of the party. The national organization of these parties then does not control nor is it controlled by the provincial organizations. The Co-operative Commonwealth Federation national organization is dependent on and operates through the provincial organizations. The Social Credit national organization is largely an appendage of two provincial organizations.

The study indicates that federalism does not require a particular type of political party organization but that a variety of organizations and procedures are possible under a federal system. It is concluded that a study of party financing is one of several valid methods of studying the power arrangements of a political party.

Microfilm \$3.95; Xerox \$13.20. 305 pages.

THE INFLUENCE OF GOVERNMENT COUNSEL
ON SUPREME COURT DECISIONS
INVOLVING THE COMMERCE POWER

(L. C. Card No. Mic 58-7744)

James Richard Klonoski, Ph.D. University of Michigan, 1958

The purpose of this study is to assess the character of the role played by government counsel and the influence they exerted on the Supreme Court in commerce cases between the years 1895-1946. Nationalization of the Constitution took place during this period of time in the realm of constitutional law primarily through a reinterpretation of the clause which bestows upon Congress power "to regulate commerce with foreign nations, and among the several states." Congress responded to the problems created by the maturation of an industrial economy by passing a mass of regulatory legislation based on the commerce power. Government counsel consequently were called upon to defend such legislation before the Supreme Court. Counsel's station was an intermediate one between the changing external world of fact and the constitutional world of the Supreme Court. Throughout the commerce debate the briefs of counsel attempted to keep these two worlds in relatively close harmony. The manner in which counsel defended commerce legislation and the success and/or failure they experienced in their advocacy are described and analyzed in this study.

The materials included in the study are approached from the viewpoint of constitutional history and constitutional law. The historical approach is utilized because counsel's performance and influence were to a great extent conditioned by the nature of the times in which they argued and by the individual personalities and philosophies of Attorneys General and Solicitors General. The constitutional law approach provides the study with its basic continuity. The focus of the study is upon the development of six major theoretical propositions concerning the nature of congressional power to regulate commerce which government counsel urged upon the Supreme Court throughout the commerce debate. By means of these propositions counsel were most easily able to rationalize in acceptable constitutional theory and law the ever-expanding commercial regulatory activity of the national government.

The government briefs reveal that counsel played an unsteady but ultimately positive role in the process by which the commerce power was nationalized. This fact was ascribable in part to the conservative or liberal outlook of the government advocates. In addition, the degree of involvement and zeal displayed by counsel in their commerce case advocacy were determined by the kind and amount of commerce legislation they were called upon to defend. Counsel's success, in turn, was largely determined by the needs of the times and the Supreme Court's willingness to rewrite the constitutional law of the commerce clause to reflect these national economic needs. The commerce power theorizing of the most aggressive and imaginative government advocate did indeed constitute an additional pressure upon the Court. But the significance of counsel's theorization lay far less in the immediate pressure exerted upon the Supreme Court and far more in the direction such theorizing gave to the opinions of the Court as that body reinterpreted commercial constitutional law in the light of national economic development.

The following conclusions seem valid in terms of the evidence: (1) the kind and amount of influence exercised by counsel on the Supreme Court was determined primarily by events in the world outside constitutional law and by the economic-political philosophies of the Supreme Court Justices (2) the arguments of counsel did not influence the will of the Supreme Court in the process by which it arrived at its decisions so much as the contentions of counsel in the form of new or modified constitutional theory served to rationalize the Court's decision once the Justices had made up their minds on the basic issues involved in any case.

Microfilm \$5.95; Xerox \$20.80. 465 pages.

THE MINOR PARTIES IN THE SOVIET ZONE OF GERMANY: THE COMMUNIST PREPARATION AND USE OF "TRANSMISSION BELTS" TO THE EAST GERMAN MIDDLE CLASS

(L. C. Card No. Mic 58-7412)

John August Wortman, Ph.D.

University of Minnesota, 1958

Adviser: John E. Turner

The existence of five parties within the East German "parliamentary republic" constitutes a divergence from the Soviet pattern of the single party operating through a system of Soviets. This deviation can be partially explained by changes since 1917 in the Communist approach to revolution and social transformation. Events forced the Soviet leaders to abandon their original optimism on the possibility of successful revolution abroad and on the speed with which Communism could be realized in their own country. Nevertheless, Marxism-Leninism, which permitted the Party to use any means to execute social transformation, provided sufficient justification for the totalitarian system that developed under Stalin. The Communists "redefined" revolution and social transformation to allow the forceful imposition of this system abroad. With the defeat of Nazi Germany, the Red Army carried into Europe the "revolution from without," after which, the leaders of the local Communist parties began their "revolution from above." The liquidation of the bourgeois state was accomplished by a bureaucratic dissection of this political system from within, and by 1948, effective political opposition was eliminated. All satellite leaders except Tito agreed to "construct Socialism" according to the theory and practice of the USSR.

In East Germany, as in the other satellites, the Communists have used their official ideology to justify their dictatorship and to argue for conformity. Nevertheless, Marxism-Leninism has influenced their operating assumptions. The Socialist Unity Party has consistently held that elimination of private property represents the most basic advance to the higher order. Moreover, it has divided East German society into the three Marxist-prescribed classes for purposes of social organization and "reeducation." It has followed the orthodox view that the petty bourgeoisie can and must be converted to Socialism. Transformation of an advanced society like East Germany presented the Communists with the problems of a large

middle class that had persistently refused to wither away and of a "petty bourgeois infection" of all classes. In seeking a solution, they resorted to the deception which had been emphasized in Stalin's "redefinition" of social transformation. Realizing the limited attraction of Marxism-Leninism, they created "non-Marxist transmission belts" to defend the regime with appeals based on popular "bourgeois" values. They achieved this objective through the Gleichschaltung of the established parties, the Christian Democratic Union and the Liberal Democratic Party, and through the formation of two new ones, the National Democratic Party and the Democratic Peasant Party. The effort expended in reinterpreting "bourgeois" values had depended upon the Communist assessment of the popular strength of these values. The Communists have decided that most Germans are susceptible to nationalist appeals, and in their approach to Christianity and Liberalism, they have assumed that only Christianity deserves a serious "redefinition."

While the experiment with the minor parties illustrates Communist flexibility in an attempt to win support, it also reveals that the Communist insistence on conformity made it impossible for the minor parties to gain a following. Forbidden to reflect the views of the German middle class, the "petty bourgeois parties" have supported attacks against the economic position of this class and have attempted to "reeducate" them through Soviet agitational techniques. While the minor parties have failed to win many converts, they have helped break resistance by stressing the inevitability of sovietization. Although it is uncertain whether this pattern of control will be repeated elsewhere, the Communists have consistently adhered to it in Germany, even after Stalin's death. They may feel that the minor parties deserve to exist simply for the purpose of demonstrating to the middle class that opposition to Communist policies is hopeless.

Microfilm \$5.15; Xerox \$18.40. 401 pages.

POLITICAL SCIENCE, INTERNATIONAL LAW AND RELATIONS

FRANKLIN D. ROOSEVELT'S THEORY OF INTERNATIONAL RELATIONS

(L. C. Card No. Mic 58-5963)

Willard Range, Ph.D.
The University of North Carolina, 1958

Supervisor: S. Shepard Jones

This study attempts to answer three questions: 1) What was Roosevelt's explanation for the breakdown of world order in the first half of the twentieth century? 2) What, in Roosevelt's view, were the implications of that breakdown for the United States? and 3) What kind of a world order did Roosevelt propose should replace the order that had broken down.

In answer to the first question, the author's analysis indicates that Roosevelt explained the breakdown of world order as the result of seven factors: 1) weaknesses in the

Versailles Treaty; 2) the corruption of the League of Nations; 3) the unresponsiveness of many governments to modern needs; 4) the rise to power of evil and/or misguided leaders; 5) trade barriers and armaments; 6) pacifism and appearement; and 7) spiritual and moral disintegration, especially in Europe.

In answer to the second question the study gives Roosevelt's arguments as to why isolationism was impossible for the United States, describes his geopolitical theory, and presents Roosevelt's arguments as to why the United States should assume responsibility to prevent the creation of an Axis dominated world. It shows also how the President moved gradually through the stages of neutrality, quasi-belligerency, and belligerency.

In answer to the third question, the author's analysis indicates that Roosevelt's proposals for a new world order consisted of seven major suggestions: 1) Such evil philosophies, institutions, and leaders as were symbolized by the Axis states must be rooted out everywhere; 2) all nations except the Big Power policemen of the future should disarm; 3) trusteeship and self-determination should replace colonialism and all other devices whereby one people could exploit another people; 4) democracy and individual freedom should be spread everywhere; 5) a good neighbor climate of opinion should govern all relations among states; 6) a global New Deal should be promoted to raise standards of life everywhere; and 7) this new order should be held together by international organizations and a system of collective security under the guardianship of the Big Powers and the specific leadership of the United States.

In evaluating Roosevelt's theory the author concluded that the President's thinking revealed a remarkable balance between realism and idealism; but his theory suffered from two major weaknesses: 1) an inadequate understanding of the struggle for power and the concept of power; and 2) an almost complete disregard of the force of nationalism.

Microfilm \$5.25; Xerox \$18.60. 409 pages.

POLITICAL SCIENCE, PUBLIC ADMINISTRATION

THE PATH TO THE COURT: A STUDY OF FEDERAL JUDICIAL APPOINTMENTS

(L. C. Card No. Mic 58-7587)

Richard Kitchens Burke, Ph.D. Vanderbilt University, 1958

Supervisor: Professor Robert J. Harris

In brief, this is a study of the "politics" of Federal judicial appointments. The basic research materials used were the available official records of the United States Senate Committee on the Judiciary and the Office of the Attorney General of the United States. The records of the following were studied: (1) approximately three hundred (300) nominations to the United States District Courts between 1929 and 1955; (2) one hundred thirteen (113) nominations to the United States Courts of Appeals between 1921 and 1955; (3) thirty-six (36) nominations to the

Supreme Court of the United States between 1901 and 1955. Appointments to the special, territorial and District of Columbia courts were omitted from the study.

Designed primarily as a "who gets what, when and how" type of research project, the study provides sufficient evidence for a number of generalizations on the nature of Federal judicial appointments. Some of the more important of these generalizations are:

(1) The Constitutional mode of selecting Federal judges permits, if it does not encourage, political appointments—i.e., appointments based on political rather than profes—

sional merit.

(2) Political appointments to the various levels of the Federal court system are the rule, not the exception.

(3) The primary factors of importance in judicial appointments have been (a) personal friendship, (b) party or political service, and (c) the system itself.

(4) Professional merit and qualifications have ranked with other secondary factors such as age, race, religion, geography, ideology, etc. in influencing nominations.

(5) Superior judicial temperament and professional qualifications have seldom been the basis for selection.

(6) The primary recruiting areas for the judges varies somewhat with the level of the courts. While the majority of the nominees to each level of the court system had had prior political experience, recruitment for appointment to the Supreme Court was largely from persons who were holding or had held Federal administrative or legislative offices. Recruitment for nominees to the Courts of Appeals was largely from the state and District Court benches. The recruiting of nominees for the District Courts was primarily from the "political bar"--i.e., lawyers with political experience and backgrounds.

(7) Presidents and senators, administrations and parties vary in the emphasis placed on political factors. However, the variation is one of degree. Even those Presidents who have tried to establish minimum standards in the past have had to yield to the inexorable demands of

"politics."

(8) Supreme Court nominations tend to be presidential patronage; Courts of Appeals nominations tend to be joint presidential-senatorial patronage. All are party patronage, but only in the sense that membership in the party of the President is generally considered to be a prerequisite for prospective nominees.

These findings indicate a serious conflict between our theory of the role and function of a judiciary in society and our practices and procedures in selecting the men who are to fulfill this role and function. The traditional theory of the role of the judiciary in American society appears to demand the selection of men who are known to possess judicial temperament and superior professional ability. Yet appointments to the Federal courts have been based on factors of personal friendship, political service, etc., which have little, if any, relationship to judicial competence.

Microfilm \$6.20; Xerox \$22.00. 487 pages.

THE CENTRAL AND SOUTHERN FLORIDA FLOOD CONTROL PROJECT: A STUDY IN INTERGOVERNMENTAL COOPERATION AND PUBLIC ADMINISTRATION

(L. C. Card No. Mic 58-5936)

John M. De Grove, Ph.D. The University of North Carolina, 1958

Supervisor: Frederic N. Cleaveland

Achieving full use of the water resources of a region is a vastly complex operation that in a Federal system almost inevitably involves Federal, state, and local units of government. The increasing importance of improving techniques for utilizing the nation's water is demonstrated by the concentrated study of all phases of water problems during the past decade. Since the beginning of the Eisenhower administration increased emphasis has been given the question of a proper division of responsibility for water resource development between Federal and non-Federal interests.

Within a broad framework of national water problems, this study comprises a detailed analysis of a water resource project in central and southern Florida. The analysis focuses upon the efforts of the principal state agency involved to coordinate the efforts of the many Federal, state, and local agencies concerned with the project.

In recent years many examinations have been made of the American Federal system of government. A central concern of most of these studies has been the question of whether states can function as full partners with the Federal government in carrying out governmental functions in policy areas such as natural resource development. Many of these studies have recommended sweeping organizational and fiscal changes as a necessary prerequisite to more effective state participation in the Federal system. This study explores the question of whether, in this one case at least, the state can assume a leading role in carrying out an important governmental function that calls for a maximum coordinating effort without extensive organizational and fiscal changes. Conclusions regarding the answer to this question have been drawn from an analysis of: (a) the organizational and fiscal development of the Central and Southern Florida Flood Control District, the state agency with primary responsibility for the project; (b) the efforts of the Flood Control District to develop a pattern of coordination with the Corps of Engineers involving a major role for the state agency; (c) Flood Control District attempts to direct the development of secondary systems of water control; (d) District efforts to realize fully the multi-purpose potential of the water resources of the region; and (e) the attempt by the Flood Control District to serve as a center of coordination for the many Federal, state, and local agencies concerned with the project. Microfilm \$6.25; Xerox \$22.00. 489 pages.

THE EXECUTIVE OFFICE OF THE PRESIDENT: A STUDY OF ITS DEVELOPMENT WITH EMPHASIS ON THE PERIOD 1939-1953

(L. C. Card No. Mic 59-672)

Harold H. Roth, Ph.D. The American University, 1959

This is a study of the Executive Office of the President in relation to the duties and responsibilities of the President's job and his need for staff assistance therein, pursued within an historical setting, with emphasis on the period 1939 to 1953. The research stems from the telegraphic message of the Report of the President's Committee in January 1937: "The President needs help. His immediate staff assistance is entirely inadequate." The problem of the dissertation is to ascertain how and how well measures taken to provide staff assistance for the President since 1937 have answered this cry for help, and particularly how the Executive Office of the President has met the President's needs.

The inquiry proceeds by exploring five questions, which are set forth below with indications of the organization of the chapters:

- 1. What is the President's job, for which he needs help in the form of staff assistance? After an Introduction defining the problem, reviewing previous studies in the field, and describing sources of data for the dissertation, Chapter I analyzes the President's day to day activities, classifying these within the multiplicity of Presidential roles, and deriving from them seven essential functions or processes basic to everything the President must do and for which he needs staff assistance: Information, Communication, Planning, Decision-making, Human Relations, Coordination, and Inspection.
- 2. When and how did the Executive Office of the President come into existence as an agency of staff assistance to the President? Chapter II studies the concept of the Executive Office of the President, holding it to be clearly co-existent with the Presidency. A review of early experience of the Presidents in staff assistance introduces a study of Presidential staff facilities during the New Deal and of efforts toward improvement in the reorganization movement.
- 3. What developments have occurred in the course of the history of the Executive Office of the President? Two chapters are devoted to this question. Chapter III takes in developments from the organic Executive Order 8248 to the end of the Roosevelt Administration, covering Assistants and Advisers, the Bureau of the Budget, other institutional staff agencies, and special facilities for military affairs, foreign relations, and emergency management. Chapter IV carries the developments through the Truman Administration, detailing the growth of the White House Office, of institutional facilities for management and counsel, and of new-line developments including the Council of Economic Advisers and various mobilization and security agencies.
- 4. What does the Executive Office of the President do and what does it not do that needs to be done? The final chapter, after summarizing developments to 1953 and surveying adjustments by President Eisenhower in 1953, analyzes the workings of the Executive Office of the

President, particularly in terms of its aid and assistance in the functions of Information, Communication, Planning, Decision-making, Human Relations, Coordination, and Inspection. Particular attention is focused on deficiencies in inspectional services.

5. How well does the Executive Office of the President fill the need of the President for staff assistance, and could it be improved? The concluding pages offer evaluations and recommendations.

The results of the research were the following evaluations: That the Executive Office of the President has increased to perhaps too large a size; That it has acquired status and acceptability from public and Congress; That it has maintained stability although undergoing frequent reorganization; That the President has practically unfettered control of the number and organization of his immediate aides, in which there has been a remarkable specialization of expertness; That statutory prescriptions are not a serious limitation except in regard to advisory commissions; and That Presidential aides must avoid even the suspicion of evil. Recommendations follow: That the President must himself head his Office; That he guard against isolation; That he equip himself with staff for discovering and interpreting conditions and opinions and also for Inspection; That he recognize the limits of staff services, ensure that plans are not crushed in staff work, and act to coordinate his many Special Assistants.

Microfilm \$7.50; Xerox \$26.00. 589 pages.

THE INFORMATIONAL AND EDUCATIONAL WORK OF THE U. S. DEPARTMENT OF AGRICULTURE

(L. C. Card No. Mic 58-3029)

R. Lyle Webster, Ph.D. The American University, 1958

This study analyzes and evaluates the informational and educational activities of the U. S. Department of Agriculture to project recommendations as to their improvement and development and to develop findings useful to administrators and others concerned with this function in public administration.

The comprehensive informational and educational work in this large Federal civilian agency is carried on largely in information units in 13 constituent agencies and a central Office of Information, with coordination of the total activity a responsibility of the central Office. The constituent agencies are concerned with specialized subject matter such as research, conservation, economic action programs, credit, and marketing. The Department's informational and educational activity has been developing for nearly three-quarters of a century, has had annual Congressional review for many years, and rests on a detailed and extensive legal base.

The study contains basic analyses of the purpose, organization, and operation of the informational and educational functions as carried out in the constituent agencies and the central Office developed from interviews, official published and working documents, organization charts, and Congressional testimony. These are supplemented with analyses of: (1) the public relations activities of the

Secretary of Agriculture and their significance; (2) informational and educational relationships between the Department and the States (particularly those with the Land Grant Colleges and Universities and the State Departments of Agriculture); (3) relationships between the Department and agricultural trade and general organizations; and (4) the use made by individual agencies of the different media, both in Washington and in the field. From the basic analyses there are developed patterns of organization and operation, with particular emphasis on various types of media by the different types of agencies in the Department.

Conclusions and recommendations drawn from the experience in the Department offer guides for administrators generally. Among these are: most effective programs result when all employees have informational and educational functions as part of their jobs; work with all media should be centralized in a central office; the specialized media type of organization is more effective than the "generalist" approach.

Findings as to ratios of personnel used in the informational and educational function to total personnel offer limited guides for agencies with responsibilities comparable to certain of those in the Department of Agriculture. The study found that the Department devotes about one man-year of information work for every 125 full-time employees and that the informational personnel of the larger constituent agencies (with more than 2000 employees) typically represent less than 1 percent of total employment while for smaller agencies (with less than 2000 employees) the number of information personnel typically is several percent of total employment.

Recommendations applying directly to the work in the Department are that: reports of the use of information media by agencies should be improved and refined in order to develop more accurate ratios for this work: better guidance should be given by the central Office of Information for organization in constituent agencies for the informational and educational function; and, there should be developed coordinating mechanisms in the field by the central Office of Information comparable to those exercised in the Department in Washington.

The study emphasizes organization and operation for information and education and recommends further studies on the effect of these activities on farmers and citizens generally. Microfilm \$6.10; Xerox \$21.60. 480 pages.

THE PRESTIGE OF THE PUBLIC SERVICE IN A METROPOLITAN COMMUNITY

(L. C. Card No. Mic 58-1018)

Deil Spencer Wright, Ph.D. University of Michigan, 1957

Prestige is the respect or esteem which the population gives to positions in the public service. The prestige which the public service commands has an important bearing on the morale and recruitment problems of governmental agencies. Prestige is also indicative of citizen willingness to comply with administrative regulations.

In his 1928 Chicago research Professor Leonard D. White discovered that the prestige of the public service was low. Later empirical studies seemed to confirm this

finding but they were somewhat misleading because they focused on select or specialized groups and they used the desire to work for government as the sole measure of prestige. It was therefore desirable to collect data on the esteem which the population at large has for the public service by using a more adequate method for measuring prestige. Such data were collected by the 1954 survey of the Detroit Area Study from a cross-section sample of 764 adult respondents living in the Detroit metropolitan area. Following Professor White's original method, the Detroit Area Study measured prestige by offering respondents a choice between paired occupations--one in public employment, the other in private employment. The respondent was asked to select which position, public or private, he felt had more prestige. A Guttman scale of the four occupational items used divided the sample into groups giving low, middle, and high prestige to the public service. The analysis consisted chiefly of tabulating this division of the prestige variable by three types of independent variables -- social structure, political, and admin-

The research findings may be treated under three general headings:

- 1. Time Trends in the Prestige of Public Employment: The increased prestige of the public service is reflected by several aspects of the data collected. Higher prestige rankings were recorded on the occupational items used in both the 1928 and 1954 studies. The populace finds public employees more courteous and evaluates its dealings with public employees higher than in the past. A majority (56 per cent) prefer employment by the United States Government to employment by a private firm (30 per cent).
- 2. Correlates and Non-Correlates of Prestige: The major social structure variables of social class, income, occupation, and education were inversely related to prestige. Negroes and women gave higher prestige respectively than whites and men. These relationships were statistically significant at the .05 level of confidence. One group expected to give high prestige to the public service-public employees and their immediate kin--gave slightly lower prestige than the rest of the population. Certain political variables were related to prestige, with the public service commanding significantly higher respect from those desiring governmental intervention in the social and economic spheres, from Democrats, and from those low in political self-confidence. These relationships remained statistically significant after social class, sex, race, and age were held constant. Administrative variables related to prestige were the desire to work for government, the judgment that public employees are more courteous than private employees, and the desire for the public service to expand the scope of its actions. These relationships were also statistically significant. Two administrative variables, contact with public agencies and evaluation of their performance, were not related to prestige.
- 3. The Public Service in a Democratic Society: In a democracy the public service ought to meet the immediate needs of the population and at the same time its operations should be judged rationally and critically. The marked relationships found between prestige and certain social, political, and administrative variables indicate that prestige is accorded largely on the basis of whether the public service meets the immediate needs of the population. The findings that contact with public agencies and evaluation of their performance are not related to prestige indicate

that the public service serves the populace broadly and that the population in some measure evaluates the operations of the public service on a rational and independently critical basis.

The major conclusions of the study are as follows: The increased benefits dispensed by the public service, the security features of public employment, and the improved estimate of the courteousness of public employees make a position in the public service more esteemed and more desirable than previously. The chief determinants of prestige are those variables which are closely connected with the immediate needs or self-interest orientation of the population. An exception to this must be made for public employees and their immediate kin who do not perceive of public employment as placing them in an elite group. There is a sphere in which the citizenry evaluates the operations of the public service rationally and realistically. Such an evaluation is a sine qua non in a democratic society.

Microfilm \$2.35; Xerox \$8.20. 180 pages.

PSYCHOLOGY

PSYCHOLOGY, GENERAL

THE PROJECTIVE INTERPRETATION OF EARLY RECOLLECTIONS

(L. C. Card No. Mic 58-3638)

Louis Arthur Berman, Ph.D. University of Michigan, 1958

The purpose of this study is to apply an experimental test to a principle advocated by Alfred Adler; that easily recalled childhood memories have a diagnostic value-i.e., that they provide a measure of the individual's present personality characteristics. The significance of this principle for personality theory is indicated by comparing the Adlerian viewpoint with the writings of Sigmund Freud on various recollection problems: screen memories, traumatic memories and fantasied memories. The Adlerian and Freudian viewpoints are also compared according to Lewin's differentiation between the Aristotelian and Galileian modes of thought.

Recent clinical papers on early recollections are reviewed, as well as the experimental literature on this topic. Certain gestalt principles of learning are utilized to describe aspects of the retention-recall process that lend a diagnostic quality to early recollections. The production of early recollections is also related to a component of the self system, named the Past Me. This concept is introduced to describe how early recollections serve the individual's need for rationalization, projection, regression and ego support.

The experiment employs two group-administered tests: an early recollections test, and a self rating inventory. The recollections test utilizes a booklet that asks for the individual's three earliest recollections, and then asks the subject to use 21 sets of "stimulus words" to remind him of more incidents that occurred before his sixth birthday. The self rating inventory includes six 16-variable self rating scales, a glossary defining each of the 16 traits, and an objective scoring system that yields five scores for each subject. A 72-category coding system was devised for scoring the early recollections data. The above set of measures was administered to a group of 115 Dearborn (Michigan) public school pupils; consisting of 53 11-year old boys and girls, and 62 17-year old boys and girls.

Analysis of the results was guided by the following questions: (1) Does the self rating inventory yield internally consistent results? Do subjects agree as to where a given trait belongs on a given scale? What age and sex differences are evident in self rating responses? (2) Does the early recollections test yield systematic age and sex differences; and are these differences consistent with areas of agreement in personality theory? (3) Do individual scores on the self rating inventory show significant correlations with the subjects' independently scored early recollections?

Positive findings were obtained in each of the above three areas of analysis. Thirty-nine age and sex differences in frequency of early recollections codings meet or exceed the .10-.05 level of significance. Of these 39 findings, 20 confirm specific hypotheses, 2 contradict our original predictions, and 17 findings were not anticipated in our list of hypotheses. The 39 findings are heavily loaded with categories that are more popular for the 17-year old and for the female sub-groups.

Early recollections also show systematic correlation to self rating measures. Recollection themes most characteristic of individuals whose self ratings show "good adjustment" are playing adult role, sanctioned orality, hoarding, achievement, conventionality and passenger role. (The last-mentioned category covers incidents in which the subject is taken for a ride by auto, buggy, train, etc.) "Poor adjustment" self rating scorers yield early recollection themes infantile role, resists role advancement, death observed, behavior problem, and overt hostility.

Limitations of the test sample (its limited size, the atypical character and small number of 17-year old boys) indicate the need for replication to verify or correct our generalizations. Tentatively, at least, our findings support the Adlerian principle that early recollections may serve as a projective test of personality. More important, probably, than the empirical data offered here are the theoretical and methodological contributions to the analysis of early recollections, and their implications for personality theory.

Microfilm \$3.40; Xerox \$11.60. 264 pages.

A STUDY OF EMPLOYEE ATTITUDES AND SUPERVISOR SENSITIVITY TO ATTITUDES AS RELATED TO SUPERVISORY AND DEPARTMENTAL EFFECTIVENESS

(L. C. Card No. Mic 58-7961)

Robert Anthony Bolda, Ph.D. Purdue University, 1958

Major Professor: C. H. Lawshe

A six-scale attitude questionnaire was administered to the factory employees of an industrial organization. The six scales measured attitudes toward the Company, Supervisor Initiation, Supervisor Consideration, Working Conditions, Job Activity and Financial Benefits. The first three scales were available from previous research. The last three were developed for the study.

A total of 753 factory employees participated in the survey representing approximately 55% of the work force in the organization. Using a randomly selected primary group of 350 questionnaires, the Working Conditions, Job Activity and Financial Benefits scales were item analyzed. Department mean scores were computed and were reported back to the sponsoring management along with individual

item performances.

Criteria of departmental and supervisory effectiveness were obtained by having top and middle management rate the departments in the organization and the supervisors who lead those departments, respectively. First-line supervisors were asked to guess the percents of their employees who responded favorably to each item on the questionnaire. By comparing the actual responses to the anticipated responses, two sensitivity measures were developed for each supervisor in each attitude area: (a) a measure of the absolute differences between guesses and actual responses, and (b) a measure of the extent to which guessed and actual responses correlated.

Analyses were conducted after the data had been broken down into three classes appropriate to the major work-force sub-divisions in the organization: male production employees, female production employees and skilled trades employees. Correlations were run between mean employee attitude scores and the effectiveness criteria. Measures of supervisory sensitivity were also

correlated with the criteria.

It was found that relationships between rated departmental effectiveness and supervisory characteristics were significantly positive. In addition, significant relationships between attitudes and the criteria varied according to the work-force group; significant correlations between criteria and attitudes occurred in the female group in those attitude areas which were highly workoriented, such as Working Conditions, Financial Benefits, Job Activity and Supervisor Initiation. Among the production males, Working Conditions and Supervisor Consideration "came through", while among the skilled trades people, only Supervisor Initiation correlated with the criteria.

The sensitivity measure based on the absolute differences between guessed and actual responses failed to correlate significantly with the criteria. When sensitivity was measured in terms of the correlations between actual and guessed responses, it was found that sensitivity to Consideration attitudes correlated with both criteria for the female and skilled trades people.

It is suggested that the attitude data reflect credibility of the basic hypothesis that attitudes are related to work group effectiveness. With regard to sensitivity as measured by the "guessing-game" procedure, it is recommended that more conceptual effort be devoted to identification of phenomena associated with perceptual accuracy.

Microfilm \$2.00; Xerox \$3.80. 68 pages.

AFFECTIVE DISCRIMINATION, OBSERVATIONAL EFFECTIVENESS, AND EXPRESSED DECISIONS

(L. C. Card No. Mic 58-7962)

Robert Lee Brune, Ph.D. Purdue University, 1958

Major Professor: C. H. Lawshe

An investigation of the interrelations between impression formation and the processes of decision making in interpersonal situations.

The common goal of human relations training is to develop skills which will increase the effectivenss of interpersonal relations. The criteria of effectiveness range from expressions of satisfaction by the trainees with the training methods themselves to expressions of satisfaction with the trainees by their co-workers. The former criterion has influenced the content of many training programs. The author proposes that the ultimate success of training in this area depends upon its ability to increase the probability that the trainees can and will make decisions which are appropriate to the objective information in a social situation. An investigation of the decision making process itself should provide a guide to the orientation of training efforts.

The stimulus situation used in the study consisted of a filmstrip which presents the development of a problem between a supervisor and an employee. The film ends at a point where supervisory action is required to resolve the situation. Three variables of social decision making

were defined. The measures are:

Affective Discrimination. The direction and intensity of attitude toward the film characters.

Observational Effectiveness. The degree of use of the objective information in the film.

Expressed Decision. The appropriateness of the decision relative to the objective information.

Subjects were shown the film and responses were obtained and scored.

The subjects were 131 male industrial supervisors who ranged in age from 30 years to 60 years and 57 male college students who ranged in age from 18 years to 21 years. Three kinds of introductions to the film were devised to vary the observational set of the subjects.

Twenty-two hypotheses were formulated concerning the interrelations of the measures between and within the experimental groups and differences between the performance levels of experimental groups. Tests of the hypotheses support the following conclusions.

1. Disapproval toward a person affects the acquisition of information regarding this person. The greater

the degree of disapproval, the greater the distortion or occlusion of information concerning that person.

- 2. Disapproval toward a person is related to decisions regarding this person. The greater the degree of disapproval, the greater relation between the attitude and the decision.
- The acquisition of information is related to the quality of the decision. The less the distortion or occlusion of information, the better the quality of the selected course of action.
- 4. Disapproval toward a person has persistent effects on the relation between additional information regarding this person and courses of action concerning this person. The greater the disapproval toward a person, the less likely it is that additional information will change the previously expressed decision.

The implications of these conclusions to training are indicated. Microfilm \$2.00; Xerox \$4.00. 74 pages.

A METHOD FOR PREDICTING SUCCESS OF COMMERCE STUDENTS

(L. C. Card No. Mic 58-7965)

John Mills Champion, Ph.D. Purdue University, 1958

Major Professor: Joseph Tiffin

The major objective of this study was to develop a battery of tests for the purpose of predicting academic achievement of college freshmen enrolled in a commerce, or business administration curriculum. In addition, an exploratory examination was then made to determine if differentiating characteristics existed between those individuals for which the test battery was a good predictor and those individuals for which the test battery was a poor predictor.

Scores on 33 test variables, and criterion data (first year grade point average) were obtained for 300 subjects. The criterion was examined and evaluated with respect to its reliability and relevance to accumulative grade point average upon graduation.

A random sample of 102 subjects, stratified on the basis of age and sex, was separated from the original group of 300 subjects for the purpose of serving as a hold-out group on which to cross-validate a regression equation derived from the scores of the primary group of 198 subjects.

Product-moment correlations were computed between test scores and criterion values for subjects in the primary group. Those tests found to correlate significantly at the one per cent level, 21 in number, were subjected to an analysis by the Wherry-Doolittle test selection method.

Four tests were selected by the test selection method, and were, in order of their selection, the Ohio State University Psychological Test, the Name Comparison subtest of the Minnesota Clerical Test, the Clerical scale of the Kuder Preference Record, and the Word Meaning subtest of the Iowa Silent Reading Tests.

The predictive value of the selected battery was determined by obtaining a predicted grade point average for each of the subjects in the hold-out group through use of a regression equation derived from the test selection method. The predicted grade point averages were correlated with the actual grade point averages obtained by students in the hold-out group at the conclusion of their freshman year. A correlation coefficient of .60 was the result of this computation. The standard error of estimate is 1.24. A series of graphical presentations were prepared to further evaluate and interpret the data. The same treatment was accorded data obtained from the extrication of a regression equation based on the first three selected tests from the original group of tests, and also for the first two selected tests from the original group.

An identification was then made of subjects for which the four-test prediction scheme accurately predicted grade point average, and those subjects for which the prediction scheme was less accurate. Examination was made of test scores not a part of the selected test battery, criterion values, and personal characteristics for subjects comprising the two groups. No differences were found to exist between the two groups for the characteristics examined to a degree sufficiently significant to warrant further analysis.

Microfilm \$2.00; Xerox \$4.20. 76 pages.

THE EFFECTS OF SAMPLE SIZE ON PREDICTION WITH THREE TEST WEIGHTING METHODS

(L. C. Card No. Mic 58-7970)

Howard Junior Douglass, Ph.D. Purdue University, 1958

Major Professor: C. H. Lawshe

A research study in industrial psychology which makes an empirical evaluation of sample sizes for deriving test weights used in multiple regression equations.

Various researchers have demonstrated empirically that the use of simple weighting systems in multiple regression equations resulted in predictions similar to those achieved when elaborate weighting systems were used. Evidence suggests that weights may vary widely without altering predictive efficiency.

The purpose of this study was to test the hypothesis that an increase in the size of the sample upon which the test weights were derived would result in greater, differential predictive efficiency for various test weighting methods than was achieved at smaller sample sizes.

The subjects were 1188 Air Force airmen who had taken the Airman Classification Battery and had graduated from the Air Force Aircraft Mechanic School for which a criterion of final, technical school grade was available.

There were three variables in this study: (a) three primary random sample sizes of 88, 300, and 500; (b) three batteries composed of tests selected from the Airman Classification Battery which intercorrelated at (.60), (.40), and (.30) while maintaining an average validity coefficient of (.50); and (c) three test weighting methods varying in statistical complexity from a Dwyer algorithm for finding the inverse of a matrix which produced "true" partial regression coefficients to an approximation method

developed by Jenkins to the final method of simply adding stanine scores.

Partial regression coefficients were derived by the Dwyer algorithm and the Jenkins methods on the three primary sample sizes and applied to three secondary or hold-out groups which were random samples not used in the weight derivations. The derived weights were applied to the various test batteries at each primary sample size resulting in a total of eighteen regression equations. At the same time the stanine scores of the various predictor tests were summed.

As each composite score-criterion score distribution was obtained for each hold-out group it was dichotomized at the median of each variable. Then, the per cent correct prediction of the criterion was determined by summing the high composite-high criterion scores group with the low composite-low criterion scores group and dividing by 100, the total in each hold-out group.

With these values obtained, four analyses of variance were calculated. The first analysis concerned three sample sizes by three types of batteries by two weighting methods. The stanine score method was not included in this model. Only the main effect of batteries was significant at the (.05) level. No interactions or other main effects were significant at the (.05) level.

Three other analyses of variance were conducted with batteries by methods and their interaction at the three levels of sample size. In none of these three analyses was any effect significant at the (.05) level.

In summary, the following conclusions may be drawn from the analysis of the data in this study:

a. No improvement in the predictive efficiency of a regression equation results from deriving the test weights by various methods on a large sample, defined as a sample with an N over 100 subjects.

b. Differential predictive efficiency increases as the mean test intercorrelation in a regression equation decreases from (.60) to (.30).

c. No differential effect in prediction results as a function of using methods requiring increased statistical complexity for deriving weights.

Microfilm \$2.00; Xerox \$3.00. 50 pages.

A FACTOR ANALYSIS OF SHORTHAND-TRANSCRIPTION ABILITY

(L. C. Card No. Mic 58-7619)

Jordan Hale, Ph.D. New York University, 1958

Chairman: Dr. John J. Kinsella

The purpose of this study was to reveal, identify, interpret, and unify by means of a factor analysis the psychological factors which enter into the shorthand-transcription process. Factor analysis is a statistical tool peculiarly adapted to extracting significant factors—sources of variation—because it sorts out basic underlying abilities by breaking down large numbers of variables into broad, major, independent groupings and assigning to each group or factor a weight or loading indicative of its importance. It helps to reduce duplication in testing programs where

tests with different names actually measure the same trait. This is in accordance with the principles of simplicity or parsimony where many variables are represented by a few common factors and each factor is represented by its most highly loaded or saturated test.

The sub-problems consisted of a determination of the psychological aptitudes or abilities inherent in the short-hand-transcription process and the selection of appropriate psychological tests and other instruments which would measure these aptitudes or abilities most effectively.

Five orthogonal (independent, uncorrelated) factors were hypothesized: verbal, perceptual, manual dexterity, abstract thinking, and personal.

Seventy-eight shorthand-transcription students in advanced stenography classes in three New York City high schools were given a series of 23 tests designed to measure such aptitudes as reading, vocabulary, word sense, spelling, manual dexterity, name and number comparison, spatial visualization, abstract thinking, symbol manipulation, perseverance, speed of writing, memory, phonetics, typewriting speed and accuracy, and to determine attitudes towards school and work-study habits. A 24th test, the New York State Combination Shorthand, Transcription, and Typewriting Regents Examination, was administered as the criterion. The student I.Q. distribution, with a mean of 104.34, was in effect normal with no significant skewness or kurtosis and was assumed to be representative of the parent group from which it was drawn.

The raw scores made by the 78 students were combined into one over-all distribution for each test. No attempt was made to compare schools or classes. All tests were intercorrelated with each other, using a product-moment formula, and the correlation matrix was factored on an IBM 650 electronic data processing machine by the Thurstone centroid method. Three significant factors were obtained, which were then rotated according to the criteria for simple structure and positive manifold in order to arrive at a factor configuration which would render possible a unique and meaningful identification and interpretation of the factors.

The three factors after rotation were identified as follows:

a. Psychomotor Speed, consisting of perceptual and manual speed and ability to work quickly under stress without breaking down;

b. Verbal, consisting of the ability to manipulate or to work with words and meanings;

c. Non-verbal with a spatial visualization-mechanical ability component.

These three factors were shown to be essentially independent with a slight overlap between Psychomotor Speed and Non-Verbal ability on perceptual aptitude.

The original hypothesis of five independent factors was not completely verified because only three were obtained. The hypothesis was partially verified, however, in the sense that the five factors hypothesized were reduced or consolidated into three factors which contained the aptitudes represented by the five factors.

Analysis of the correlation clusters for the most highly saturated tests in each factor confirmed the conclusion of essential orthogonality.

The most highly loaded test for each factor was analyzed for test saturation or purity on the factor. Fifty-four per cent of the total variance of the Minnesota Clerical Number Comparison test can be attributed to the

psychomotor speed factor. Eighty-four per cent of the total variance of the Turse Word Discrimination sub-test can be attributed to the Verbal factor. Forty-four per cent of the total variance of the Turse Symbol Transcription sub-test can be attributed to the Non-verbal ability factor.

The following recommendations were made:

1. A similar factor analysis should be conducted using more valid tests of psychomotor speed, non-verbal ability, personality, and motivation.

2. The most highly loaded test for each factor should be administered to other shorthand-transcription classes together with a regents or some other criterion in order to obtain a multiple regression equation for predictive purposes.

3. The most highly loaded test for each factor should be given to beginning shorthand students and a study conducted to discover the value of the tests for predictive purposes.

4. A prognostic test should be constructed using the factors obtained in this study.

5. A similar factor study should be conducted in a school system teaching Gregg shorthand outside New York City to determine the consistency (invariance) of the factors obtained in this study.

Microfilm \$2.00; Xerox \$6.60. 139 pages.

A DEVELOPMENTAL STUDY OF CONCEPT FORMATION BEHAVIOR IN PRE-SCHOOL CHILDREN AS MEASURED BY THE HUNTER-PASCAL CONCEPT FORMATION TEST

(L. C. Card No. Mic 58-7601)

Bernard D. Kaiman, Ph.D. The University of Tennessee, 1958

Major Professor: G. R. Pascal

The present study sought to investigate concept formation behavior in pre-school children. The Hunter-Pascal Concept Formation Test, which is based on two classic research methods, delayed reaction and double alternation, was employed. The test comprises nine graded problems. The five simplest problems were used in this study: An immediate reaction task involving a very short delay; a short delayed reaction task involving a fifteen second delay; a long delay task involving a delay of one minute; a cued single alternation task combining delay with alternation, and a single alternation task. The most sensitive measure of performance is a score based on number of presentations of reward prior to criterion of success on any problem.

Subjects were seventy normal, white, pre-school children, ranging in age from four months to sixty-four months, mostly from several nursery schools in Knoxville, Tennessee. Data were obtained on chronological age and sex of each subject and on education and occupation of the father of each subject. For thirty subjects Stanford-Binet Intelligence Scale results were obtained. The subjects were individually tested using small pieces of candy as reward.

Test performance was analyzed to determine effects

of variables of chronological age, intelligence and sex of subjects, and educational and occupational levels of fathers of each subject, and relationships between these variables.

Correlation coefficients were obtained: Between the presentations score (PS) and chronological age, eta = .918, r = .876; between PS and IQ, rho = .002; between PS and MA, rho = .543; between PS and sex, rphi/phi'max=.019; between PS and educational level of subjects' fathers, r = .084, and between PS and occupational level of subjects fathers, r = .125. A highly significant difference was found between the correlation of PS and chronological age as compared with the correlation of PS and the other variables, while no significant differences were found between the correlations of PS and intelligence, sex, and socio-economic status as measured by fathers' education and occupation.

Conclusions about this sample of pre-school children drawn were:

1. There is a close relationship between chronological age and concept formation as measured by the Hunter-Pascal Concept Formation Test.

2. There is relatively little relationship between concept formation and the variables of sex, intelligence and socio-economic status as measured by the father's education and occupation.

3. Chronological age seems to be the most important determinant in concept formation.

4. The development of concept formation in pre-school children is orderly and progressive along maturational lines.

5. The test offers considerable possibilities for research into various aspects related to learning problems involved in the conceptual process.

6. The test holds promise of development into a valid method of clinically appraising conceptual abilities in young children.

Microfilm \$2.00; Xerox \$6.80. 143 pages.

AN ANALYSIS OF CERTAIN PSYCHOGRAMMATICAL CATEGORIES IN EXPOSITORY VERBAL SITUATIONS

(L. C. Card No. Mic 58-7421)

Robert E. Miller, Ph.D. University of Minnesota, 1957

It has previously been shown that the verb-adjective ratio and certain other psychogrammatical variables may be related to individual differences. Little has been known, however, of the reliabilities and minimum sample lengths in such verbal studies, the form of the verbal distributions, normative data, relationships among the psychogrammatical variables, and the consistency with which the variables are used in different verbal situations. The present study is an investigation of all these problems.

Data were obtained from three qualitatively different expository themes written by each of 62 subjects in a college freshman English class. All themes were determined to meet the requirements of the assignments and each contained 500 words after deletion of quotations.

The unit of analysis was the word in its orthographic

definition. Psychogrammatical categories were chosen to permit classification of each word in one and only one way. Essentially conventional definitions were provided for each of the following categories: nouns, pronouns, adjectives, articles, verbs, auxiliaries, adverbs, conjunctions, gerunds, infinitives, participles, prepositions, interjections, and the verb-adjective ratio. These categories were applied to 93,000 words in 186 themes.

The mean internal consistency coefficient for the categories was found to be .77, while the mean inter-scorer reliability was .94. The sample length for an internal consistency of .90 varied from 340 words to 4,685 words, depending upon the category. All distributions assumed the normal form except where frequencies were very small. Quartile and standard score norms were provided for each category in each of the three assignments.

Various relationships among the categories were hypothesized on the basis of an interpretation of grammar as a set of rules to facilitate social communication which will be reinforced. All categories in one theme assignment were intercorrelated and the matrix subjected to Tryon's cluster analysis. While the hypotheses did not exactly describe the results, they were largely confirmed. The analysis yielded three clusters which proved to be reducible to two. These were designated the Action and Identification clusters because of the verb-like character of the former and the noun-like character of the latter. The two clusters showed a high negative intercorrelation. Between them they accounted for seven of the original categories. Five other categories were carried through the analysis as residuals.

Using a variable from each cluster and certain selected residuals, an analysis of variance was performed to determine the consistency of use of the categories in the three verbal situations. Variances attributable to theme assignments and to subjects were separately extracted. It was found that the three assignments differed significantly in the frequency of verbs, adverbs, and an appropriate transformation of the verb-adjective ratio. These findings were explained in terms of the qualitative differences among the assignments. It was further found that the subjects differed from each other significantly in the use of nouns, verbs, and the transformed verb-adjective ratio. Equivocal evidence for differences in the use of adverbs was also found but no significant results were obtained for adjectives. The significant differences were interpreted in terms of "traits," and the trait consistency was measured by the intra-class correlation. The mean coefficient was found to be .24.

Microfilm \$2.85; Xerox \$9.80. 218 pages.

DEVELOPMENT OF A MULTI-MEDIA CREATIVITY TEST

(L. C. Card No. Mic 58-7983)

Lionel Wadell Mosing, Ph.D. Purdue University, 1958

Major Professor: N. C. Kephart

The purpose of the investigation was to develop valid and convenient measures of some generic aspects of creativity or originality. It was hypothesized that associative responses to commonly experienced stimuli would provide valid indications of creative ability even in differently defined groups of persons. Further, it was hypothesized that judged creativity would be positively and significantly related to the ability to restructure figural material.

Six experimental tests were constructed to explore the feasibility of these hypotheses. Two test formats were used, inventive or completion-type items, and selective-response items. The tests were validated initially on a group of college seniors majoring in aeronautical engineering. Several performance and rating criteria were developed. The completion-type response tests were positively and significantly related to creativity whereas the selective-type response tests were not. The three most valid and practical of the experimental tests were combined to form the Multi-Media Creativity Test (MMCT). Scores on the MMCT were found to be relatively independent of cumulative grade average and intelligence test scores in the initial validation study.

The MMCT was next validated with two differently defined groups for purposes of comparison and validity generalization. A group of high school honors students, rated on literary creativity, and a group of industrial management graduate students, rated on creativity, were studied. The MMCT scores made valid discriminations between persons judged more creative from those judged less creative in both groups. Intelligence test scores were relatively independent of MMCT scores in the graduate student group. Thus, the MMCT was positively and significantly related to creativity in three differently defined groups.

The MMCT score distributions in the three validation groups did not differ significantly from each other, therefore those individuals judged high on creativity and those individuals judged low on creativity were combined across groups to form a creative group and a noncreative group. The MMCT scores made valid discriminations between the creative and noncreative groups across different judges, education levels, and age groups. The MMCT scores were found to be relatively independent of intelligence test scores and scholastic indices.

In conclusion, individual differences in the number and variety of associative responses to commonly experienced stimuli were positively and significantly related to creativity. Between group differences were not related to those aspects of creativity measured by the MMCT. In general, tests requiring inventive or completion-type responses were significantly related to creativity whereas those requiring selective responses were not. It would seem that creative ability, or some generic aspects of that ability, could be quite satisfactorily measured by the associative responses made by persons to commonly experienced stimuli.

Microfilm \$2.00; Xerox \$3.00. 58 pages.

AN ANALYSIS OF JOB ACTIVITIES: INFORMATION-RECEIVING, MENTAL, AND WORK PERFORMANCE

(L. C. Card No. Mic 58-7985)

George Joseph Palmer, Jr., Ph.D. Purdue University, 1958

Major Professor: Ernest J. McCormick

A research problem in industrial psychology concerned with interrelationships among information-receiving, mental, and physical work performance activities through application of work activities checklist to a sample of 250 jobs in a large steel manufacturing company.

Factor analysis of five sections of the checklist resulted in fourteen multiple group factors, which were designated (1) Information from Physical Objects, (2) Information from Moving Objects vs. Information from Heated Objects, (3) Routine Work Decisions vs. Personnel Decisions, (4) Supervisory and Professional Decisions vs. Physical Activity, (5) Routine Work Decisions vs. Business Planning, (6) Routine Work Contacts and Communications vs. Managerial Contacts and Communications. (7) Verbal Communications vs. Signals, (8) Receiving Signals vs. Public Contact Activity, (9) Originating Communications vs. Receiving Communications, (10) Manual Operations, (11) Use of Craftsman's Tools vs. Use of Other Hand Implements, (12) General Physical Activity vs. Sedentary Activity, (13) Sedentary Activity vs. Manual or Bodily Activity, (14) Manual Coordination vs. Other Physical Coordinations.

Factor variables were derived for each of the fourteen factors; these variables were intercorrelated together with General Educational Development and Work Conditions items. A principal components factor analysis produced four higher-order factors which were rotated to simple structure. The factors were designated (1) General Decision-Making and Mental Activity, a general factor, (2) Sedentary Work vs. Physical Work, (3) Administrative Communications, Contacts and Planning vs. Routine Work Decisions and Information, (4) Craftsman's Knowledge and Skill vs. Decisions and Knowledge in Other Physical Work.

With certain reservations for the job descriptions as bases of job information, it was concluded that the factors were meaningful dimensions of job activities. The factor variables provided convenient and useful forms of quantified job information; and these variables are derivable by methods commonly employed in the development of psychological tests. Measures of jobs developed in this way may find further uses in investigations of jobs, tests, organizations, and their interrelationships.

Microfilm \$2.00; Xerox \$7.00. 150 pages.

PREDICTION OF MANAGERIAL ATTAINMENT FROM EARLY CAREER DATA

(L. C. Card No. Mic 58-7986)

John Howard Proctor, Ph.D. Purdue University, 1958

Major Professor: Joseph Tiffin

Development and application of a systematic procedure for the analysis of employment history data towards the prediction of managerial attainment.

Employment History Summaries of 150 oil company managers were gathered and Management Position Level (MPL) assignments were made by company officials, where possible, to the positions historically held by each manager. Those employment histories with partial MPL assignments were submitted to two sets of raters who judged whether a move historically made by a manager was upward, downward, or horizontal. Eighty-five managers had sufficiently complete employment history summaries to be analyzed.

A formula and set of Convention Rules were developed to obtain rate of movement indices every two years through-

out the careers of all sample managers.

Investigation in the primary group revealed level of entry into the company and rate of movement early in career predicted future (in the historical sense) attainment. The criterion was MPL attained as of 1955. A composite score, called the Pathway Coefficient, based on level of entry into the company, and rate of movement through the tenth year predicted high and low criterion managers at the .05 level of significance when tried on the holdout group.

A suggestion is offered for the prediction of future upward movement based on value of early career moves rather than number of early career moves.

Microfilm \$2.00; Xerox \$3.80. 66 pages.

CONSUMER EVALUATION OF THE CARO-RED TOMATO

(L. C. Card No. Mic 58-7988)

Andrew Peter Radkins, Ph.D. Purdue University, 1958

Major Professor: E. J. McCormick

The Caro-Red is a new high vitamin A tomato variety developed at Purdue University. The purpose of this study was to evaluate consumer reaction to this new variety. Consumer reaction was separated into two phases; each phase is best stated as a question. Can consumers taste the difference between the Caro-Red variety and representative comparison varieties (Sunray, Rutgers, and Kokomo)? Do consumers prefer the Caro-Red variety over the comparison varieties or vice versa?

A total of 2,979 fairgoers acted as taste testing subjects while attending the 1957 Indiana State Fair. Triangle test data were gathered to determine if the Caro-Red variety tastes different from the comparison varieties. These triangle tests were conducted under red masking

light so that the difference judgments were based on taste alone. Paired test data were gathered to determine the preferences between the Caro-Red variety and the comparison varieties. These paired tests were conducted under both red masking light and white light. Preferences determined under white light were based on taste and color combined. Each subject filled out a questionnaire allowing the difference and preference data to be analyzed in terms of the age, sex, and residence of the experimental subjects.

Using statistical hypothesis testing procedures, the data were analyzed and the following conclusions were drawn:

- 1. The Caro-Red variety has a taste which is different from the taste of the Sunray, Rutgers, and Kokomo varieties.
- 2. The three comparison varieties have tastes which are equally distinguishable from the Caro-Red taste.
- 3. There is no preference between the Rutgers and Caro-Red varieties on the basis of taste alone, but there is a preference for the Rutgers variety over the Caro-Red variety on the basis of color and taste combined.
- 4. There is no preference between the Kokomo and Caro-Red varieties on the basis of taste alone, but there is a preference for the Kokomo variety over the Caro-Red variety on the basis of color and taste combined.
- 5. The Sunray variety is preferred over the Caro-Red variety on the basis of taste alone and also on the basis of color and taste combined.
- 6. For the varieties included in this study, tomato preferences based on color and taste combined are biased in favor of the redder of the two varieties that are compared.
- 7. Taste acuity for females is high up to the age of 30, but then decreases with increasing age; the decrease apparently occurs rapidly in the early 30's.
- 8. Taste acuity remains essentially constant with increasing age for males.

The last two conclusions are made viewing the measured variable in the triangle test as an index of taste acuity.

In the planning stage of this study, fixed sample size designs and sequential designs were developed for evaluating the hypotheses associated with the triangle and paired tests. Although fixed sample size designs were actually used in arriving at the conclusions stated in this study, the same data were analyzed using the sequential designs. It was found that, for the nine hypothesis tests involved, the two types of designs yielded exactly the same final results. The sequential designs, however, required an average of about 50% less data to yield these results.

Microfilm \$2.00; Xerox \$5.60. 114 pages.

THE SEMIPROJECTIVE USE OF EMOTIONALLY LOADED WORDS IN MEASURING PERSONALITY VARIABLES IN CHILDREN

(L. C. Card No. Mic 58-2650)

Arthur Barclay Sweney, Ph.D. University of Houston, 1958

In light of the need for study of new methods and media for group personality assessment of elementary aged school

children, this exploratory study was conducted. The stimulus content was composed of emotionally loaded words to which a finite number of responses were presented for choice. The instrument allows the subject four distinct stimulus situations: multiple choice of best or worst out of groups of three, rating of words, choice of one out of four words to complete an ambiguous sentence, and choice of words to describe a set of neutral pictures of persons illustrating roles.

The population for the study consisted of fourth, fifth, and sixth grade white children from the Houston Independent School District. These children represented generally the different cultural and socioeconomic components of the white community, with the exception of the colored group, which was omitted as an intentional limit to the scope of the study since the schools are segregated at this time.

A scoring scheme was developed through the aid of item analysis and twelve scales were adapted because of the presence of external criteria for validation within the supplementary data collected on the children. These scales are masculinity, femininity, high aggression, low aggression, intropunitiveness, extrapunitiveness, maturity, immaturity, peer adjustment, peer maladjustment, conformity, and nonconformity. The last two scales were derived from the actions of the total subject population and indicate great potentiality as screening scales.

The reliabilities of the individual scales ranged from .48 to .85 with most of them lying in the .60's and .70's. The validities of the individual scales ranged from .12 to .73. These validities were probably reduced by inaccuracies in the criteria groups used for validation.

The scale intercorrelations ranged from -.51 to .65 with consistent relationships existing in each submatrix of four boxes. Comparisons between scale intercorrelations obtained by partialing out the picture variable and those obtained by correcting individual papers for the factor yielded comparable but not the same results.

These results of the study indicate not only potential ability for loaded words to be used in personality assessment of children, but indicate that the experimental instrument in its present form has some value.

Future research should be performed both in the area of perfection of the test and also inapplication of present and subsequent instruments. Lack of nationwide standardization makes it impossible to rule out the possibility that the properties of the test might have only local implications.

Microfilm \$2.00; Xerox \$6.80. 141 pages.

THE RELATIONSHIP BETWEEN THE STRONG VOCATIONAL INTEREST BLANK AND THE GUILFORD-MARTIN PERSONALITY INVENTORY AMONG SALESMEN

(L. C. Card No. Mic 59-635)

Edwin Russell Thomas, Ph.D. Syracuse University, 1958

Supervisor: Harry W. Hepuer

This study was concerned with the relationship between scores on an interest blank and scores on a personality

inventory. An attempt was made to classify a group of subjects by means of the Strong Vocational Interest Blank in essentially a similar manner as they were classified by the Guilford-Martin Inventory of Factors GAMIN, STDCR, and O, Ag., Co.

The sample consisted of seven hundred and fifty-four male applicants for sales positions. They were ranked from highest to lowest according to their scores of factor G of the Guilford-Martin. This distribution was then divided into upper and lower halves. An item analysis of the Strong revealed how each subject answered each question of this blank. The number answering "Yes", "Doubtful", or "No" on the Strong was tabulated for the upper and lower halves of the group. These numbers were converted into percentages and the differences in percentages between the two groups computed. This procedure was followed for each of the thirteen Guilford-Martin traits.

From these differences in percentages thirteen new scoring keys for the Strong were constructed, using a weighting method consistent with the technique used by Strong when scoring the blank for interests. A new sample of one hundred and fifty subjects was drawn from the original population but excluding the seven hundred and fifty-four previously utilized. Pearson Product-moment correlations were computed between scores on the Guilford-Martin and scores obtained using the new keys for the Strong. All but one of the correlations (Agreeableness, r = .11), were significant but varied widely. The highest correlation was r = .74 (Social introversion). Seven of the thirteen correlations were .50 or higher.

The reliabilities of the new keys were obtained by the test-retest method on sixty students in undergraduate classes in psychology. These also varied somewhat being generally of the order .70 to .90.

A rank order correlation between number of questions on the Strong weighted other than zero and the correlations between Strong and Guilford-Martin scores was obtained. This correlation was .68.

The conclusion was drawn that while a highly significant relationship between the Strong Vocational Interest Blank and the Guilford-Martin Inventory was obtained on all but one factor, the new Strong could not be scored with the new key and substituted for the Guilford-Martin.

Speculation as to why these results were obtained centered around the validity of the criterion and the lack of operational definitions for some of the Guilford-Martin traits. It was suggested that further research concerning the relationships between inventoried interests and personality traits should take these factors into consideration.

Microfilm \$2.00; Xerox \$5.60. 113 pages.

PSYCHOLOGICAL STUDY OF EMOTIONAL REACTIONS
OF CHILDREN TO TONSILLECTOMY:
A COMPARATIVE STUDY OF EMOTIONAL FACTORS
IN TWO GROUPS OF CHILDREN WHO HAVE
RECEIVED EMOTIONAL PREPARATION FOR
TONSILLECTOMY AND TWO GROUPS OF CHILDREN
WHO HAVE NOT RECEIVED SUCH PREPARATION

(L. C. Card No. Mic 58-7625)

Howard M. Weinick, Ph.D. New York University, 1958

Chairmen: Professor Virginia Axline
Professor Dorothy Mereness, and
Professor H. Frederick Kilander

The tonsillectomy is the most frequent single operation of childhood, involving separation from parents, apprehension, induced loss of consciousness, loss of bodily parts and pain. The literature describes traumatic consequences experienced by children who undergo a tonsillectomy experience. The need for psychological preparation of children prior to hospital and surgical experience is considered to be a potentially alleviating procedure, essential to the emotional well-being of the child. This study investigates the effects of the tonsillectomy by evaluating children who receive psychological preparation as well as evaluating children who do not receive such preparation prior to the tonsillectomy. The need for a controlled psychological study is indicated.

The population under study was limited to forty children between the ages of five and nine years who were referred to a New York City hospital. The children were randomly distributed into two groups: a group of twenty children who received surgery from one surgeon and a group of twenty who received surgery from a second surgeon. Ten of each surgeon's group received emotional preparation from the surgeon before the tonsillectomy and ten went through the routine surgical event prescribed by the hospital, which does not include emotional preparation. The designation of whether the child was to be prepared or unprepared was based on an odd-even random selection. The surgeon's groups were equated as to age and sex.

Both surgeons employed the same preparation procedure. One surgeon possessed experience in the use of psychoanalytic principles.

There were three psychological evaluations of each child: one occurring before preparation and surgery, another occurring from seven to ten days following the tonsillectomy and the final evaluation taking place one month following the tonsillectomy. The psychological evaluations included a questionnaire interview of the parent, the Vocabulary Sub-Test of the Revised Stanford-Binet Scale, Form L, selected pictures from the Blacky Pictures Test, selected backgrounds from the Make a Picture Story Method, the Human Figures Drawing Test, and a specially constructed Story Completion Test.

The raw data were evaluated by three clinical psychologists serving as judges. They evaluated specific factors and attitudes related to the study and rated each child on personality variables listed on a rating sheet as to the nature of the child's attitudes and the intensity of these attitudes. The judges' ratings were statistically tested for significant disagreement. It was noted that they agreed on twelve of fourteen variables.

The judges' ratings were subjected to statistical analysis from which the following findings and conclusions were drawn:

- 1. Children, between the ages of five and nine, who receive no preparation prior to the tonsillectomy experience, but possess unhealthy attitudes in areas relevant to the experience, demonstrate an intensification of these attitudes following the experience. The intensification is noted in the immediate and subsequent postoperative periods.
- 2. Children who receive no preparation prior to the tonsillectomy, but initially possess healthy attitudes in areas considered affected by the experience, demonstrate a significant change in the direction of pathological adjustment following the tonsillectomy.

3. Children who receive emotional preparation for the tonsillectomy experience, and initially possess unhealthy attitudes in areas affected by the tonsillectomy, demonstrate changes in the direction of healthy attitudes in the same areas, in both postoperative evaluations.

4. The two groups of children prepared for the tonsillectomy experience, each prepared by a different surgeon, showed no significant differences between each other concerning the frequency of healthy attitude occurrences. This demonstrates that it is not the psychoanalytic background of the surgeon, but the preparation procedure employed that effects the beneficial consequences.

The practicability of preparation of children is indicated.

Microfilm \$2.80; Xerox \$9.60. 214 pages.

THE PREDICTIVE RELATIONSHIP OF SELECTED VARIABLES TO THE VOCATIONAL INTEREST STABILITY OF HIGH SCHOOL STUDENTS

(L. C. Card No. Mic 58-7411)

Robert Marshall White, Ph.D. University of Minnesota, 1958

Adviser: Willis E. Dugan

This study investigated the predictive relationship of 29 variables to the amount of measured vocational interest change occurring over an 18 month interval. The first interest test was administered to students during the early part of the ninth grade and the second at the end of their sophomore year. Data on the variables studied for their predictive relationship with profile change were obtained at the time of the first interest testing. A complete class of a given high school was studied. The group consisted of 145 boys and 185 girls who had progressed through grades nine and ten of that system and upon whom complete and valid data were obtainable.

The predictor variables studied were Age, Father's Occupation, Work Experience, Farm Background, Parent Education, Intelligence, scores made on each scale of the first interest test, and personality characteristics as measured by the Minnesota Counseling Inventory. Each of the 10 scales of the Kuder Preference Record, each of the 7 clinical scales of the MCI, and each of 7 occupational categories was regarded as a separate variable.

Data on all variables were combined into a multiple regression equation to predict interest change as measured

by DR². DR² indicates the amount of change occurring in the ranks of the ten scales on the two administrations and is equal to the ΣD^2 term in the Spearman rank-order correlation formula. The development of a multiple regression equation employing 29 predictors was possible because of the availability of an 1103 Univac.

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When the 29 variables were used to predict interest change, the multiple correlation for both boys and girls was .50. This was significantly different from zero at the 5% level for girls, but was not for boys. The Beta of each variable was tested for significance by the variance ratio method. At the 5% level, the variable Family Relationships was the only one contributing significantly to the girls' equation, and Intelligence was similarly identified for the boys.

The correlations between each independent variable and change scores were computed and found to be very low; the highest for boys being (.28) for Computational and (-.22) for Intelligence. For girls, the two largest correlations were (-.22) for Intelligence and (-.20) for Parent Education.

A second equation was developed by combining the six variables which had either the highest zero-order correlations with the criterion, or significant Betas in equation one. The multiple correlations were .37 for boys and .36 for girls; both significant at the 1% level. To test the significance of the relationship of each variable to change in this equation, the Betas were tested as before. For the boys, Computational was significant at the 1% level and Intelligence at the 5% level. For the girls, no variable had a significant Beta.

To investigate further the somewhat contradictory situation of the girls, analysis of variance procedures were used to examine the singular relationship between each of the six variables and the criterion. Significant relationships were observed at the 1% level for the variable Intelligence, and at the 5% level for the Parent Education, Social Service, Mood, and Outdoor variables. Some doubt exists regarding Mood and Outdoor, however, since their sub-group variances were not homogeneous.

It was concluded that statistically significant predictive relationships existed between certain variables and amount of interest change over two school years, but that these relationships were of limited utility for purposes of individual prediction.

Microfilm \$3.30; Xerox \$11.20. 253 pages.

THE DEVELOPMENT AND USE OF AN OCCUPATIONAL FACTORS RATING SCALE IN COLLEGE COUNSELING

(L. C. Card No. Mic 58-7437)

Robert Matthew Wright, Ed.D. University of Missouri, 1958

Supervisor: Paul C. Polmantier

DIIRDOSE

To develop and use an Occupational Factors Rating Scale with male college counseling clients.

METHOD OF RESEARCH:

An experimental scale (the Occupational Factors Rating

Scale) was developed by the investigator to test the relationship between five motivational factors and the measured vocational interests of male college students (on the Strong Vocational Interest Blank). The five occupational (motivational) factors dealt with in this study were:

The SALARY of each of the forty-five occupations on the Male profile sheet of the <u>Strong Vocational Interest</u> Blank.

The SOCIAL STATUS of each of these forty-five occupations.

The TRAINING involved in each of these forty-five occupations.

The APTITUDES AND ABILITIES necessary to be successful in each of these forty-five occupations.

The LIKING TO BE for each of these forty-five occupations.

One hundred male college students were administered the Occupational Factors Rating Scale, in conjunction with the Strong Vocational Interest Blank for Men, during the winter semester of the 1957-58 school year. The subjects' measured interests and their reactions to the occupational factors were tabulated and subjected to statistical tests for the significance of differences (chi square or critical ratio as applicable).

SUMMARY:

The findings of this study indicated that:

1. A preponderance of the subjects had measured interests in the Technical, Business Detail, and Business Contact areas on the Strong Vocational Interest Blank.

2. The occupational factors of TRAINING, APTITUDES AND ABILITIES, and LIKING TO BE were significantly related to measured vocational interests for a majority of the occupations on the Strong profile sheet. The factors of SALARY and SOCIAL STATUS were significantly related to measured vocational interests to a lesser extent.

3. The male students in the sample who were enrolled in the College of Arts and Science differed significantly from those enrolled in the Technical-Scientific colleges (Engineering and Agriculture), in terms of vocational interest patterns on the Strong Vocational Interest Blank.

4. There was no significant "response set" toward any of the five factors on the Occupational Factors Rating Scale which would distinguish one curricular group from another.

5. A significant relationship was found between Masculinity-Femininity scores on the Strong Vocational Interest Blank and types of training courses desired by the subjects.

6. The Arts and Science group had significantly higher mean scores on the Occupational Level scale of the Strong Vocational Interest Blank than did the Technical-Science group.

7. The Arts and Science group had significantly lower mean scores on the Masculinity-Femininity scale of the Strong Vocational Interest Blank than did the Technical-Science group.

8. The Arts and Science group was significantly more predisposed toward the Business Detail, Business Contact, and Social Welfare areas of expressed interest on the Occupational Factors Rating Scale, whereas the Technical-Science group was significantly more inclined toward the

applied areas of science, and the use of well learned skills.

9. The Arts and Science group was significantly more favorable toward general knowledge and cultural types of college courses than was the Technical-Science group on the Occupational Factors Rating Scale.

CONCLUSIONS:

- 1. The Occupational Factors Rating Scale stood up well, as an experimental scale, for testing the relationship between motivational factors and measured vocational interests.
- 2. The Occupational Factors Rating Scale can be used as a quick early survey of a client's perceptions of the occupations on the Strong Vocational Interest Blank, and should help the counselor to form hypotheses about the motivational structure of the client's vocational interests.
- 3. The Occupational Factors Rating Scale tends to call both the client's and counselor's attention to areas of client motivation which can be crucial to the vocational problem. Microfilm \$2.00; Xerox \$6.20. 130 pages.

PSYCHOLOGY, CLINICAL

THE RELATIONS OF CHRONICITY, MORBIDITY, AND SOCIAL CLASS TO THE VOCATIONAL INTERESTS OF PSYCHIATRIC PATIENTS

(L. C. Card No. Mic 58-7441)

Giles Derwood Carnes, Ph.D. University of Missouri, 1958

Supervisor: Dr. Robin J. Clyde

This study was designed to investigate the vocational interests of hospitalized, psychiatric patients. The Strong Vocational Interest Blank was administered to 40 patients who were selected according to three independent variables; social class status, bizarreness of behavior, and length of hospitalization. Each of the independent variables was sub-divided into a greater and lesser sub-group making eight experimental conditions for a 2x2x2 factorial design.

Twenty-nine hypotheses were advanced which can be summarized into the following five predictions: 1. greater psychiatric disturbance will be associated with fewer high scores on the occupational scales, 2. greater disturbance will be associated with lesser profile variability, 3. greater disturbance will be found associated with lower Occupational Level scores, 4. greater disturbance will be associated with lower Interest Maturity scores, and 5. greater psychiatric disturbance will be correlated with high Masculinity-Femininity scores. Acute patients were assumed to have greater personality strengths than chronic patients and high morbid patients were assumed to have greater personality strengths (thus lesser disturbance) than low morbid patients. The social class variable served mainly as a control.

Intensity of vocational interest was measured by the number of A and B+ scores. Profile variability was

measured by computing the standard deviation of the T scores on the 45 occupational scales for each subject. Five analyses of variance were computed using the two measures just cited and using the three non-occupational scale scores respectively as units.

In general, the results did not confirm the predictions. However, high morbid patients tended to have more A and B+ scores along with greater profile variability, and higher Interest Maturity scores were significantly related to low morbid status. Following trends noted in the five original analyses, the Production Manager Scale, the Public Administrator Scale, and especially a measure of deviant responses were found to better differentiate between the eight experimental conditions. The results from the Public Administrator and Interest Maturity Scales were quite similar, and the two scales correlated positively .69. Interest Maturity was found to correlate negatively -.61 with the measure of deviant responses. Seven measures, including the three scales just discussed, were found to bear a complex interactional relationship to morbidity in combination with social class. Comparisons with published norms indicated a greater constriction of interests for this hospital group.

The results were interpreted to mean that: (a) constriction of interests does not differentiate as well among psychiatric patients as between psychiatric patients and normal groups, (b) maladjustment is not correlated with a flat profile but is associated with greater profile variability, (c) the variables of chronic versus acute status and middle versus lower social class are not so importantly associated with vocational interests in a psychiatric population as is that of bizarreness of behavior, (d) high morbidity may be more meaningfully thought of as indicating greater disturbance rather than greater psychological strengths, (e) there is no indication that the Occupational Level Scale is a measure of drive, (f) masculinity of interests is not associated with psychiatric disturbance, (g) the vocational interests of hospitalized, psychiatric patients are so diverse that they do not fall into any type or types of interests, and (h) the vocational interests of hospitalized, psychiatric patients do not follow any of the patterns implied in the literature as associated with maladjustment. Microfilm \$2.15; Xerox \$7.60. 162 pages.

CROSS-SECTIONAL STUDY OF SCHOOL-AGE CLINICAL CASE MATERIAL

(L. C. Card No. Mic 59-310)

Sidney L. Copel, Ed.D. Temple University, 1958

Purpose of the Study

This study was undertaken to determine the nature and distribution of representative case material referred to a school clinic.

Procedure

The raw material for the project was drawn from five hundred consecutive case studies in the files of the School Clinic of the Camden, New Jersey Board of Education. The subjects under study were school-age children residing in Camden or neighboring communities. Each one of the reports was read and evaluated. The major problem in every case was determined and the cases were then grouped accordingly. In this way, it was possible to determine the distribution of major problems. The incidence of referrals made by various agencies in the community was also computed.

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From this point on, analysis of the data was made in terms of each diagnostic group. Evaluation was made of such things as racial and sexual factors, grade placements and ages of the children. Consideration was given to their performance on standard tests of intelligence and educational achievement. The incidence of associated or secondary problems was also determined.

After the above data had been obtained, the Repeaters, i.e., children tested on more than one occasion, were selected from each group and independently studied. The composition of this group was evaluated in terms of the incidence of various types of problems, racial and sexual characteristics and the distribution of grade placements.

Summary and Conclusions

The results of the study indicated that children afflicted with some sort of special handicap begin to show evidence of maladjustment at an early stage in their school careers. Those whose difficulties revolved about their inability to cope with the academic material were detected sooner than children afflicted with other kinds of problems. This applied to those cases diagnosed as Mentally or Educationally Retarded. Early difficulties in school resulted in rapid recognition of failure or deficiency.

As far as the actual distribution of problems was concerned, it was found that an overwhelming number of cases were concentrated in four diagnostic categories. In descending order of frequency they were: Mentally Retarded, Behavior Problems, Educationally Retarded and Emotionally Disturbed. The majority of these children showed a characteristic unevenness in their intellectual functioning. They were less proficient in verbal than in the manipulative skills.

The existence of secondary difficulties was found to be a common phenomenon among these children. For example, problems in academic learning were found to occur frequently among children who were disciplinary problems in the classroom or who were afflicted by some form of emotional disturbance.

When the cases were grouped along racial and sexual lines, a characteristic pattern was observed. The incidence of Negro children was inordinately large in several categories. The number of boys in almost every diagnostic group was much greater than the number of girls. The teachers were even inclined to overlook fairly obvious problems of mental deficiency in the case of the girls.

In relation to follow-up work done in the clinic, it was found that most of this was devoted to the mentally deficient. These children consumed most of the school psychologist's time.

Microfilm \$2.00; Xerox \$7.00. 150 pages.

THE BIOGRAPHICAL INVENTORY COMPARED WITH CLINICAL PREDICTION OF POST-COUNSELING BEHAVIOR OF V. A. HOSPITAL COUNSELEES

(L. C. Card No. Mic 58-7397)

Joseph Holmes Dickerson, Ph.D. University of Minnesota, 1958

This investigation concerns a clinical versus statistical prediction study carried out in the Vocational Counseling Service of a large V.A. GM&S hospital. In this service setting, disabled clients were counseled as referred, by staff and trainees whose experience varied from only a few months to over 15 years. The cases studied averaged about six hours of interviews, plus the usual tests and questionnaires. From this counseling interaction a vocational plan emerged for the client. The counselor recorded this plan as the client left and also rated the feasibility of that plan in terms of this client's physical capacity, abilities and aptitudes, emotional stability, availability of opportunity, initiative, and overall feasibility. These clinical predictions showed the counselor's judgments of his client's chances of putting that plan into effect.

Former clients were sent two follow-up questionnaires, one three months and the other a year after hospital discharge. Three letters resulted in returns of 86 and 78 per cents respectively. The criterion of how closely the respondent was following the plan, was reliably and independently judged by five experienced rehabilitation counselors.

Because clinicians presumably based their predictions on either intensive knowledge of an individual's dynamics, or through predicting future behavior from past behavior, knowledge of his past is essential. In this setting the client-completed Personal Data Sheet provided the information. The Biographical Inventory technique was selected to derive a statistical prediction of the criterion from these data. This method has a long history of successful use in a variety of settings, and it permits handling large numbers of diverse categories.

A total sample of clients who had returned both questionnaires by February 28, 1958, and whose folder contained a Plans Sheet and Personal Data Sheet comprised the original group (N of 121). Summaries of Plans Sheet and follow-up information were prepared and judged on a four-step scale for both three-month and one-year results. For the original group these judgments were highly similar. Therefore a new three-month group was substituted for the one-year return on cross-validation (random sample of 100).

The original study compared 47 "clear hits" with 51 "clear misses". Information from their Personal Data Sheets was coded by number onto a data card using 98 codes with from three to twelve logical divisions per code. Strong's tables were used to apply weights to those items where percentage differences favored either group. Individuals' weights were summed and frequency distributions of weighted scores compared for the two groups. In the original study the optimal cutting point found 96 per cent correct prediction of the criterion. This shrunk to 52 per cent correct (a chance result) when the original weights and cutting score were applied to the cross-validation group.

Using an optimum cutting score, the clinical predictions (total feasibility ratings) were within the chance

range on both studies. As the statistical predictor was only chance on cross-validation, the null hypothesis was accepted.

The failure of the statistical predictor on cross-validation may be due to the fact that Strong's tables are too sensitive (they were designed for 300 to 500 in each group). A check of greater percentage differences (eight per cent or more) found about as many items reversing themselves on cross-validation as were confirmed. Economic conditions affecting job availability, or some differences between groups may explain these results. The seriousness of client disabilities, their lower socio-economic status, or counselor inexperience may explain the chance range of clinical predictions. A listing of the 33 confirmed items is presented for further study.

Microfilm \$2.45; Xerox \$8.60. 188 pages.

A TEST OF A TRAINING PROCEDURE DESIGNED TO INCREASE THE INTENSITY OF ANGRY VERBALIZATION

(L. C. Card No. Mic 59-28)

Milan Fred Doering, Ph.D. University of Pittsburgh, 1958

Subjects, male college students, were reinforced for selecting and reading aloud the more angry of a pair of verbalizations for 60 different pairs of verbalizations. This training was designed to increase the intensity of angry verbalization made on a post-test. Various control groups were employed in a 2⁴ factorial design in order to isolate the aspects of the training which were effective in increasing the intensity of the angry verbalization made on the post-test. An analysis of covariance procedure was used to test four hypotheses:

1. A reinforcement procedure in which subjects are reinforced for selecting the angrier of two angry replies will increase the intensity of angry verbalization more than a no-reinforcement procedure in which subjects are not reinforced, but select either of two angry replies as they so choose. This hypothesis was confirmed at the .05 level.

2. The use of anger material in reinforcement training will increase the intensity of angry verbalization more than the use of egotism material in reinforcement training. This hypothesis was confirmed at the .01 level.

3. The use of easy-to-discriminate angry replies in reinforcement training will increase the intensity of angry verbalization more than the use of difficult-to-discriminate angry replies in reinforcement training. This hypothesis was not confirmed.

4. Shouting replies during reinforcement training with anger material will increase the intensity of angry verbalizations more than saying replies quietly during reinforcement training with the same anger material. This hypothesis was not confirmed.

Microfilm \$2.55; Xerox \$8.80. 193 pages.

AN INVESTIGATION OF TIME PERCEPTION IN HOSPITALIZED CHRONIC BRAIN DAMAGED PERSONS

(L. C. Card No. Mic 58-7948)

Virginia P. Frobes, Ph.D. University of Utah, 1958

Chairman: Paul B. Porter, Ph.D.

A study comparing the social time perception of brain damaged persons with that of non-brain damaged persons has been carried out. Three groups of 30 subjects each were used in the investigation; (a) a normal control group; (b) a hospitalized non-brain damaged control group; and (c) a hospitalized brain damaged group. Variables of age, verbal IQ, length of hospitalization, and chronicity of encephalopathy were controlled. A Time Inventory test was devised to measure the use of time symbols and the organization of the past, present, and future aspects of the S's concept of time. Performance of the brain damaged Ss was also examined for correlation with (a) estimated degree of functional loss; (b) EEG record; and (c) neurological rating of encephalopathy.

The results showed that: (a) the organic brain damaged person's performance on the Time Inventory was different (p<.001) from that of the non-brain damaged subjects; (b) the hospitalized non-brain damaged patients were different (p < .02) from the normal controls in their organization of the past and future; (c) the brain damaged patient's performance on the Time Inventory was correlated (p <.01 with the estimated degree of functional brain loss; (d) the biserial correlation between score on the Time Inventory and EEG record was .37 (p > .05); (e) the biserial correlation between zero to minimal and moderate to severe neurological rating and score on the Time Inventory was 1.15 (p < .001).

On the basis of both quantitative and qualitative analysis it is concluded that:

- 1. There is a reliable relationship between impaired cerebral functioning and social time perception.
- 2. The relationship between cerebral functioning and social time perception is not only a matter of intellectual
- 3. Extended hospitalization alters one's social time perception in the direction of subjectivity, lack of chronological organization, and shortened time span.
- 4. The brain damaged patient's social time concept is characterized by:
 - a. Relatively unconventional use of time symbols.
 - b. Accurate orientation as to hour, day and week.
 - c. Wide margin of error in the estimation of a 15 second and longer intervals of time.
 - d. Impaired ability to judge accurately the continuity or passage of time.
 - e. Loss of chronological order and shortened time span in the organization of the concept of past and future.
 - f. Denial of, or general indifference to, the future.
 - Impaired ability to plan for future events as the consequence of present behavior.
- 5. The orientation in social time of brain damaged persons varies by degree of functional brain loss (p<.01).
- 6. There is a reliable correlation between social time perception, as measured by the Time Inventory, and severity of neurological disease.

7. The Time Inventory test was successful in differentiating between non-brain damaged and brain damaged groups and between non-hospitalized and hospitalized groups of individuals.

Microfilm \$2.00; Xerox \$5.20. 101 pages.

AN EXPERIMENTAL INVESTIGATION OF SUBLIMINAL PERCEPTION WITH OPTICAL ILLUSIONS

(L. C. Card No. Mic 58-3885)

Mark E. Goldstein, Ph.D. Yeshiva University, 1958

Thirty-three female undergraduates were individually dark adapted for 25 minutes. During this period, in order to maintain a positive mood, a series of travel films was shown. While viewing the film, the subjects wore specially constructed red goggles to insure thorough dark adaptation. Following this was the presentation of a projected series of six optical illusions where the superimposition of a geometric figure on a pattern results in the apparent distortion of the superimposed figure. Both figures and patterns were presented as white lines against a dark background. All were equated for overall size and area. Individual thresholds were established for minimum luminance necessary for perception of the pattern.

Each pattern was then presented subliminally for $15\frac{1}{4}$ seconds. After 15 seconds, the appropriate figure was superimposed supraliminally for .25 seconds. A small luminous dot on a screen served as a fixation point. The control and experimental situations were identical except that in the control situation the pattern was never shown.

There were six presentations of each figure, randomly divided between control and experimental conditions. A seven point rating scale was used to evaluate the subject's responses. The scale consisted of the projected figure and six distortions of it arranged vertically on either side, three in the expected direction and three in the reverse direction. In order to avoid a possible judgment set, three of the scales depicted the expected distortion above the center figure, and three depicted the expected distortion below the center figure. After each presentation, the subject was asked to select the figure that most closely approximated the figure seen on the screen.

Three subjects were excluded from the final tabulations because of positive reports to a post-test inquiry concerning the conscious perception of stimulus material other than the supraliminal figures. A comparison of the control and experimental results for the remaining thirty subjects showed a significant difference between the total judgments in the direction that would be expected from the nature of the illusions.

It was concluded that the subliminal patterns were actually discriminated, but at a subconscious level. The threshold was viewed as a function of attentional factors. The determination of whether a threshold is within the conscious or subconscious range would seem to be related to manipulations of the field of discriminatory activity

and the degree of attention devoted therein.

Microfilm \$2.00; Xerox \$5.20. 102 pages.

APPLICATION OF ROTTER'S SOCIAL LEARNING THEORY TO SUBSTITUTION

(L. C. Card No. Mic 58-1219)

Prabha Khanna, Ph.D. University of Colorado, 1957

Supervisor: Assistant Professor Michael Wertheimer

An experimental investigation based on the application of Rotter's social learning theory to substitution was made. The most relevant aspects of social learning theory are contained in Rotter's statement that there is a hierarchy of possible behaviors in any situation, and that the potentiality of the occurrence of a particular behavior in a particular situation is determined by the subjective probability held by the subject regarding the occurrence of the relevant reinforcements following the behavior, and the value of that reinforcement to the subject [B.P. = f(E, R.V.)].

The variables under study included (1) the categories of needs involved, (2) the need values, and (3) the expectancies:

- 1. Two need categories, need for academic recognition (AcR) and need for love and affection (L and A), were chosen for study. The experimental situation was structured so as to involve these needs by telling subjects that they were being chosen for either of two projects, which involved AcR and L and A respectively. All tasks used, original and substitute, involved either of these two needs in the opinion of judges.
- 2. Need values were varied by selecting subjects, 64 high on AcR and 64 high on L and A, on the basis of their scores on Liverant's Goal Preference Inventory.
- 3. Expectancies were studied in two ways: by asking subjects to make expectancy statements on a 0 to 100 scale, and by including experiences of success or failure at the point of interruption by giving estimated scores 11 points above or below the predicted score.

The experimental procedure required the subjects to make expectancy statements for six tasks which were later used as substitute tasks. They were asked to predict their score on the original task, on which they were interrupted before its completion and given a success or failure score. Then, they rated the substitute tasks in order of their preference and made expectancy statements for the task of their first choice, on which they thereafter worked.

Results showed that the variable of need value significantly affected substitute choices. Those with high need value for a need category gave higher preference ratings to tasks belonging to the same need category than tasks that did not, and they rated these tasks higher than the group with low need value for the need category in question. Differences in expectancies, as measured by expectancy statements, seemed to have partly affected substitute choices, since those with high expectancy on AcR rated AcR tasks higher than the group with low AcR expectancy (but those with high expectancy for L and A did not do so for L and A tasks). Expectancies as manipulated by experiences of success and failure did not affect substitute choices. Analysis of results suggested two trends: (1) contrary to theoretical assumption, a positive correlation was found between expectancy and need value and (2) subjects with high AcR need value were generally more achievement oriented and did not react differentially to success and failure as did the L and A need value group. The last

statement was supported partially by trends indicated in the effect of interaction between need value and failure on expectancy statements. The lack of a clear effect on this interaction on preference ratings, however, suggested that when dealing with extremes in need values, variations in expectancies have to be much greater than produced in this study in order to affect preference ratings. The effect of this interaction, contrary to assumptions made, was to produce greater variability in ratings when subjects were given failure scores on a task for which they had low need value.

The study provided (1) a demonstration of the value of applying Rotter's social learning theory for a better understanding of the general area of substitution even though not all of the predictions were substantiated, (2) further evidence of the validity of Liverant's Goal Preference Inventory, and (3) some general suggestions regarding the interrelationships between the variables appearing in Rotter's basic formula.

Microfilm \$2.00; Xerox \$6.80. 143 pages.

DEVELOPMENTAL ANALYSIS OF CONCEPTUAL AND PERCEPTUAL FUNCTIONING UNDER STRESS AND NON-STRESS CONDITIONS

(L. C. Card No. Mic 58-7091)

Emma Kraidman, Ph.D. Clark University, 1958

Supervisor: Heinz Werner

This study was aimed at investigating effects of stress on maturity of conceptual and perceptual functioning. On the basis of Heinz Werner's genetic theory of mental development it was hypothesized, first, that stress would have a regressive effect, i.e., primitive modes of activity would become manifested with greater frequency than under non-stress conditions. The second hypothesis, suggested by the Jackson-Goldstein principle of hierarchical disintegration of functions, stated that conceptual activity would manifest greater regression under stress than perceptual activity. Evidence that intensity of anxiety is positively related to extent of impairment of performance manifested under stress suggested the third hypothesis. On the assumption that impairment of performance may reflect a change in level of functioning, it was hypothesized that depth of regression manifested under stress would be positively related to level of anxiety at that time.

To test these hypotheses, two perceptual tests (Word-Color and Embedded Figures) and two conceptual tests (Object Sorting and Word-Meaning) were administered to a group of heart-surgery patients (experimental group) under two conditions: pre-operatively (stress condition) and post-operatively (non-stress condition). A control group, matched to the experimental group on age, sex, education, and intelligence, was also tested twice with the same tests as were given to the experimental group. The same time interval between sessions was allowed for the control subjects as for the patients.

The scoring systems used to evaluate responses were based on genetic principles.

Hypothesis 1 was confirmed with respect to conceptual, but not with respect to perceptual activity. On the conceptual tests, the patients showed a significantly larger gain in level of performance from session 1 to session 2 than the control group; on the perceptual measures, the control group showed larger gains, although not significantly so, from session 1 to session 2 than the experimental group. These results were interpreted as evidence that stress is associated with conceptual regression. No reliable evidence was found of perceptual regression under stress.

The results mentioned above support our hypothesis of differential stress effects (Hypothesis 2).

The Word-Meaning test was also administered to twenty children to obtain information about normal immature word-signification processes. Although the children and the adults' scores are not strictly comparable, if such a comparison is made, reliable differences in level of performance were found between the children and the control group, supporting our use of this test as developmental measure. There is reliable evidence that the patients in the stress condition performed at a less mature level on this test than the control group, suggesting that their performance was more like that of the children. However, reliable differences were also found between the patients in the pre-operative session and the children, suggesting that the regression manifested by the adults on that condition was not to the level of the children tested.

The experimental and control groups differed sharply in intensity of anxiety manifested in the first session and the decrease in anxiety level shown by the experimental group on the second session was significantly greater than that shown by the control group. This finding was interpreted as evidence that in the pre-operative session the patients were functioning under severe stress.

There is reliable evidence that intensity of anxiety on the first session was positively related to level of performance on the Object-Sorting test. There is no reliable evidence, however, that intensity of anxiety was related to level of performance on the other three tests. Hypothesis 3 was therefore only partly confirmed.

Microfilm \$2.00; Xerox \$6.40. 134 pages.

THE EMPIRICAL DERIVATION OF PERSONALITY SCALES FOR THE PREDICTION OF INDIVIDUAL DIFFERENCES IN LEARNING

(L. C. Card No. Mic 59-35)

Frank M. Lackner, Ph.D. University of Pittsburgh, 1958

I. Introduction

Contemporary theorists have hypothesized differential relationships between drive level and human learning in simple and difficult task situations. Typically, drive has been measured by the Taylor Manifest Anxiety Scale, which consists of rationally selected items from the Minnesota Multiphasic Personality Inventory. The present research attempts empirical derivation of scales to predict learning on several levels of difficulty. It also investigates the role of intelligence in such learning.

II. Procedure

Subjects were 128 undergraduate student volunteers, selected on the basis of the availability of their results on

the American Council on Education Psychological Examination. Each was required to learn, through serial anticipation, two lists of nonsense syllables. One, the easy list, was constructed to maximize association value and minimize intralist similarity. The other was designed to minimize association value and maximize intralist similarity. Because of practice effects, the order of administration was varied. On the basis of correct anticipations over a fixed number of trials, subjects were ranked according to their performance on each list separately, on the sum of their performance on both lists taken together, and on the difference between their ranks on the hard and easy tasks. These rankings defined a number of criterion groups which were employed in item analyses performed on the responses of the subjects to the MMPI, which was administered to each after completion of learning. Those items which, in each analysis, proved significantly discriminatory between upper and lower halves of the criterion groups, formed scales which were validated on subjects not included in the scales' derivation. The relationships among ACE total scores, easy learning, hard learning, and total learning were investigated, as were the relationships among MAS scores and these variables.

III. Results

It proved impossible, in the present context, to derive valid scales for the prediction of easy learning, hard learning, and learning which varied in quality with variations in the difficulty level of the material. It was possible, however, to construct two scales, each with promising validity, for the prediction of summed learning performance on both tasks taken together. The first scale significantly predicted total learning when the easy list was learned first, but not when the hard task was the initial one dealt with. The second scale significantly predicted in exactly reverse fashion.

ACE scores were significantly related to total learning when the easy list was learned first, but not when the hard task was first. MAS scores failed to predict total learning, easy learning, or hard learning. The ACE correlates significantly with the first derived scale, but not with the second.

IV. Conclusions

The findings of this study have pointed to the existence of self-report differences among fast and slow learners. These differences are sufficiently significant to permit the construction of a self-report scale for the prediction of learning. The results indicate that total learning scores, and probably the entire experimental situation, may represent different things for the subjects who learned the easy list first and for those who learned the hard list first. The performance of the latter, who experienced much less success in their initial task, by virtue of the nature of the hard list, is not significantly related to intellectual ability, but is significantly predicted by one of the successful derived scales. The other scale, which validly predicts performance of easy-list-first subjects, is significantly related to intellectual level. It is suggested that the first of these scales is related to motivational and/or attitudinal factors, while the second is related to learning ability per se, as traditionally conceived. Some suggestions for future research are presented.

Microfilm \$2.00; Xerox \$4.80. 93 pages.

PERCEPTUAL RECOGNITION AS A FUNCTION OF CONFLICT AND DEFENSE

(L. C. Card No. Mic 58-7141)

Richard Herbert Levin, Ph.D. The University of Florida, 1958

Forty subjects were placed into four categories on the basis of our independent judgments of their clinical behavior. Categorization of the subjects included evaluations of their areas of intrapersonal conflict and their techniques for handling stimuli impinging on these areas. The conflict areas selected for judgment were (1) expression of aggressive impulses and (2) expression of dependency needs. The techniques for dealing with conflict stimuli were (1) repression or avoidance and (2) sensitization or unusual alertness. The four groups judged, Dependent Sensitizers, Dependent Repressors, Aggressive Sensitizers, and Aggressive Repressors, were presented 60 words tachistoscopically. Each word had been selected from a master list and placed independently by four judges into one of three groups: (1) related to dependency needs, (2) related to aggressive or hostile impulses, (3) unrelated to either of the above, and therefore neutral. For each subject each word was assigned a rank based on the order in which it was correctly identified within the list of 60 words.

The variables of class of word, conflict area, and defensive technique were treated in a nonparametric test of analysis of variance hypotheses and it was found that two hypotheses which had predicted a relationship between clinical behavior and differential perceptual recognition of emotionally related and neutral words in terms of visual thresholds were not confirmed. The results indicated the repressors in each conflict group, responded differentially to all of the words rather than selectively to any one judged list, while for the other subjects there were no significant differences in their recognition of words.

Implications for the influence of individual differences as opposed to theoretically implied effects of the defensive process were drawn, as well as possibilities by which the results, if interpretted rather broadly, may fit an existing theory relating types of defensive behavior to increasing emotionality.

Microfilm \$2.00; Xerox \$3.00. 41 pages.

A Q-METHODOLOGY INVESTIGATION OF THE ORAL AND ANAL CHARACTER AS DESCRIBED BY PSYCHOANALYTIC THEORY

(L. C. Card No. Mic 58-5919)

Henry Mandel, Ph.D. New York University, 1958

Chairman: Professor Brian E. Tomlinson

Problem

The purpose of this study is to investigate the relation of oral and anal arrays of behavior descriptions, which psychoanalytic theory asserts form cohering clusters, to arrays provided by the statistical-experimental treatment known as Q-methodology.

The Population

One hundred and two people between 25 and 45 years of age, all high school graduates and not manifestly psychotic, were used in this study. Twenty-five were used in a first, item-selection, pilot study. Seventeen were used for a second stage of item selection, and, sixty formed the final test group. Of these, the raw scores of thirty persons were treated further.

Procedure

One hundred and three descriptions of behavior by psychoanalytic theorists were increased, with minimal changes, to 448. If changed, then transcriptions of actual therapy sessions supplied the alternate or additional statement. These 448 statements were ranked by three practising psychoanalysts according to a specified list of criteria. The 208 statements remaining after this ranking were Q-sorted by 25 persons. Their data permitted ranking of the 208 statements and elimination of 48 of them. The remaining 160 statements were Q-sorted and the data permitted ranking of the statements and elimination of 64 of them. The remaining 96 statements were Q-sorted by 60 subjects and the subjects ranked according to criteria for subjects, Bartlett's test for homogeneity of variance, and the F-test of the between means-within means variance ratio.

Treatment of Data

The raw scores of the 30 subjects selected were subjected to an analysis of their variance. Using squared differences between corresponding items the scores of persons were intercorrelated for each of two decks separately. Thurstone's Complete Centroid method of factor analysis was used and six factors extracted. Separate sets of centroid factors for each deck, one set from Thurstone's simple structure rotations and one from Stephenson's simplest structure rotations were found. For each set of centroid factors separately, factor arrays were produced by weighting the raw scores of selected protocols. These arrays, in turn, were modified by partialling out the correlations between items populating corresponding cells of the analysis of variance. The final arrays, representing Q-sorts provided by hypothetical persons most highly loaded on one of the centroid factors, were subjected to an analysis of the variance.

Results

- 1) The statistical treatment provided evidence tending to disprove the assertion that all (most) of the Oral items cluster.
- 2) The statistical treatment provided evidence tending to disprove the assertion that all (most) of the Anal items cluster.
- 3) The statistical treatment provided evidence supporting the assertion that the Early Oral items cluster.
- 4) The statistical treatment provided evidence supporting the assertion that the Late Oral items cluster.
- 5) The statistical treatment provided evidence supporting the assertion that the Early Anal items cluster.
- 6) The statistical treatment provided evidence supporting the assertion that the Late Anal items cluster.

Microfilm \$3.45; Xerox \$11.80. 266 pages.

A STUDY OF THE RELATIONSHIP OF CERTAIN RORSCHACH CONTENT FACTORS TO SUCCESSFUL AND UNSUCCESSFUL EXTRA-MURAL ADJUSTMENT OF HOSPITALIZED SCHIZOPHRENIC PATIENTS

(L. C. Card No. Mic 58-7621)

Gerald Irwin Manus, Ph.D. New York University, 1958

Chairman: Dr. Roland H. Spaulding

A sample of discharged schizophrenic patients was divided into two groups on the basis of the criterion of ability or inability to remain out of a psychiatric hospital for a three year period following discharge. The two groups were matched on twelve relevent variables.

The groups were then compared on Rorschach content variables derived from previously validated scales whose reliability had also been established by the authors. Three of sixteen content variables significantly differentiated between the two groups.

It was possible to predict, at a probability level of .01, those patients who would remain out of a psychiatric hospital for the criterion period on the basis of the per cent of pleasant or positive affect responses in the record.

Patients who failed to meet the criterion for successful adjustment tended to be higher in bodily preoccupation as reflected in the Rorschach content of their responses. In addition, it was found that the successfully discharged group had a higher incidence of anxiety in sexual and interpersonal areas. There is a tendency, though not statistically significant, for the successful group to have a higher per cent of disturbed affect responses.

The predictive efficiency of the significant variables varied from 72 to 61 per cent. The problem of the significance of these findings was discussed in relation to the nature of the schizophrenic disorder, the possible meaning of the variables found to be significant and the value of an atomistic versus a global approach to the Rorschach test. Suggestions were made for further research into the content of the Rorschach test to make it more effective as a diagnostic and prognostic tool.

Microfilm \$2.00; Xerox \$4.40. 84 pages.

A STUDY OF THE ADJUSTIVE BEHAVIOR OF PRISON INMATES TO INCARCERATION

(L. C. Card No. Mic 58-1980)

Michael Morello, Ed.D. Temple University, 1958

The purpose of this investigation was to determine the adjustive behavior of inmates in relation to given periods of continuous confinement in a maximum security State Penitentiary.

A representative sample of the prison population was drawn by a modified procedure of proportional random stratification. The sample was stratified in terms of length of incarceration and race.

The Scovill Classification Test and the Stanford Achievement Test had been previously administered to the sample either when they were processed by a Classifica-

tion Center or when reclassified by a penitentiary staff. The records of each inmate in the sample were reviewed and these scores, plus identifying data, were secured. The Experimenter administered the Rosenzweig Picture-Frustration Study and the Guilford-Martin Personnel Inventory to each inmate in the sample.

The study revealed that the Caucasian prisoners as a group scored in the average range of intelligence and achieved an educational level in agreement with the measured level of free society. The Negro prisoners scored below average in intelligence and two full grades below the educational achievement level of the Caucasian Group. The study suggested that maximum security penitentiary prisoners are too sophisticated for reliable and valid measurement by a questionnaire type of psychological test.

The study also revealed two specific changes - one for non-conformity in the Caucasian Group and a change for aggression in the non-Caucasian Group.

In relation to conformity, a pattern in incarcerationrelated reactions of the Caucasian Group revealed an increased drive toward non-conformity, probably in an attempt to adjust to the penal environment.

In relation to aggression, a pattern in incarcerationrelated reactions of the non-Caucasian Group revealed an increased drive toward directing aggression onto the environment as an adjustive technique.

In these two reactions were clearly implied the patterns of "personality structuralizations" sought for in the study. Present was the necessary correlative that in each case the changing patterns developed cumulatively through increasing time-intervals of incarceration. Further, the phenomenon referred to in the study as the adjustment of prisoners to incarceration turned out to be in fact maladaptive in nature as compared with the standards of free society. More subjects in the non-Caucasian Group became increasingly aggressive as the length of incarceration increased; more subjects in the Caucasian Group, increasingly more non-conformative.

This dissertation suggests further research on this problem and in related areas.

Microfilm \$2.00; Xerox \$6.40. 133 pages.

DEPENDENCY AS A CONSTRUCT: AN EVALUATION AND SOME DATA

(L. C. Card No. Mic 58-7404)

John Walter Nelson, Ph.D. University of Minnesota, 1958

This study was undertaken in an effort to provide empirical evidence in the form of psychometric responses for the construct validity and conceptual meaningfulness of the construct of dependency. Twenty psychotherapists in a Veterans Administration outpatient clinic were given several psychometric tools (two questionnaires constructed by the investigator, the Edwards Personal Preference Schedule, a short semantic differential, and a rating form for rating four psychotherapy patients each on twenty descriptive and prognostic categories.) Dependency, as measured by the Navran Dependence Scale on the Minnesota Multiphasic Personality Inventory, was also investigated

to evaluate whether it bore any relationship to length of treatment and to ratings by psychotherapists in: firstly, a group of outpatient psychiatric patients, and secondly a group of patients in psychotherapy at the time the study was done. The direction of the ratings had been predicted on the basis of expectations derived from the clinical literature.

By the use of nonparametric measures of correlation and nonparametric tests of significance, the following conclusions were reached. The Navran Dependence Scale did not accurately predict length of treatment, although it did differentiate those patients who continued in therapy compared with those who did not contact the clinic following the intake procedure. The Navran Scale did not predict with any useful degree of accuracy the behavior of Patients in psychotherapy as observed by their therapists. Dependency as reflected by this scale was identified as a psychological construct having no association with objective situations of dependency. Dependency was found to have a high negative relationship with ego-strength, as measured by the Barron Ego-strength scale on the MMPI. The construct of dependency was found to have a high degree of meaningfulness for the therapists in this sample; theoretical predictions of correlates to dependency were confirmed at a highly significant level. Interindividual and intraindividual conceptualizations of the construct appeared to be quite stabilized and clear in meaning. A comparison of the experimental status of the construct using the Navran scale and the conceptual status of the construct using the semantic differential and a ranking technique suggested that while the construct has a highly consistent conceptual status in the thinking of the group of therapists, it possesses essentially no experimental validity within the design of this study.

The investigator does not suggest a moritorium on the use of the term but he does suggest that clinicians pay more attention to the behaviors subsumed under the rubric of dependency and that they be more cautious and critical of the theoretical constructions by which they perceive their patients. A plea for more construct validity type studies on such concepts was also strongly emphasized.

Microfilm \$2.80; Xerox \$9.60. 213 pages.

A COMPARISON OF SCHIZOPHRENICS AND NORMALS ON THE ABILITY TO SYNTHESIZE

(L. C. Card No. Mic 58-7992)

Carolyn Louise Riley, Ph.D. Purdue University, 1958

Major Professor: Franklin J. Shaw

This study was designed to investigate the performance of schizophrenics and normal subjects on two tasks of synthesis in an attempt to bring clarification to the frequently questioned hypothesis that concept formation is impaired in schizophrenia. The first hypothesis was that performance on a test of categorization is not significantly different between schizophrenic and normal groups. It was stated in the second hypothesis that there is a significant difference in the ability of schizophrenic and normal groups to reconcile differences. The third hypothesis stated that

schizophrenics could perform better on a test of categorization than on a test of reconciliation of differences.

A group of 61 process schizophrenics and 90 normal subjects were administered a test of categorization and a test of reconciliation in that order. The schizophrenic patients were pre-examined to insure that cooperativeness, limited distractability, and a degree of contact were present for their participation in the experimental study. The study was limited to schizophrenics of a process type to enhance theoretical interpretation of the data. The results may be generalized only to patients in this category.

The first hypothesis is supported by the data. There is no difference of significance between schizophrenics and normals on a test of categorization. The second hypothesis is also supported. The difference between schizophrenics and normals on a test of reconciliation of differences is significant. Results pertaining to the third hypothesis are significant in the predicted direction. Schizophrenics do less well on a reconciling task than on a categorizing task.

This evidence suggests that the existing research on thinking disorders in schizophrenia might be profitably re-examined in terms of the type of synthesis called for. Theoretical implications are suggested concerning the deficiency of reconciling abilities in schizophrenia.

Microfilm \$2.00; Xerox \$3.00. 58 pages.

THE DEVELOPMENT OF NORMS FOR THE CHILDREN'S APPERCEPTION TEST

(L. C. Card No. Mic 58-5996)

Marvin S. Rosenblatt, Ph.D. The Florida State University, 1958

The object of this longitudinal research was the formulation of developmental norms for the Children's Apperception Test and an analysis of these norms in terms of age trends, sex differences, and psychoanalytic theory. The data consisted of records from thirty-six children and included 1,780 individual stories. Subjects were children in the phallic age period (ages three through five) and in the latency age period (ages six through ten) who were annually administered the Children's Apperception Test on four to six different occasions on an individual basis. An empirical categorization of responses resulted in nine major Categories namely, I, "Activity," II, "Personal References," III, "Functional Role of the Figures," IV, "Outcome," V, "Identity Role," VI, "Omissions," VII, "Rejection of Card," VIII, "Absence of Theme," and IX, "Object Naming." These were further sub-divided into as many as thirty-six minor categories on any one card. A manual for scoring was devised and a reliability test indicated from 92% to 99% agreement between judges. An inspectional analysis as well as chi-square tests was

Significant age trends were found between the phallic and latency groups indicating a greater tendency for the older children to interact with the threatening figures of the test, to show more cooperative activities, and to regard the maternal figure as an authority, a provider, and as a punitive agent. There was less elaboration in the younger children's responses in terms of card descriptions

and reference to the figures. Numerous other age differences in the responses were distributed throughout the test.

Sex differences were noted at all ages on all but one of the ten cards and were less frequent in the phallic age group. Responses indicating aggression, provocation, disaster, and play were elicited more often by the males in the latency group. There were more role perceptions of parents in the latency group.

Comparison of the findings with analytic theory indicated that signs of the bedipal struggle were still present in the latency period. Children of both sexes in this period tended to identify with the maternal figure and regarded her as provider, authority figure, and punitive agent. There was evidence of superego functioning in the latency period as well as indications of maturational growth involving new interests, attitudes, and activities characteristic of this age period. In general, the data of this study support the value of the longitudinal approach in the use of the Children's Apperception Test and provide tentative norms for clinical use.

Microfilm \$2.50; Xerox \$8.60. 189 pages.

THE ACTIVITIES INDEX: AN INQUIRY INTO VALIDITY

(L. C. Card No. Mic 58-7236)

John Cimeon Scanlon, D.S.S. Syracuse University, 1958

This study inquires into the validity of the Activities Index on the vector level of analysis. Validity centers on the question of whether or not the profile summary provided by the Activities Index vectors is descriptive of behavior actually exhibited in daily transactional relations with peers. On an operational level, this entails the investigation of the hypothesis that the Activities Index vector rankings will be significantly related to ratings of overt behavior by lay individuals.

Seventy-eight members of a freshman class were asked to rank their peers with reference to Activities Index behavioral categories. The Activities Index rankings of the study group were then compared to the behavioral rankings by peers.

Most of the findings favor the hypothesis. However, the statistical magnitude of the results was insufficient to consider the position definitely proven. Exploration of possible reasons for the low statistical findings conclude the investigation.

Microfilm \$2.50; Xerox \$8.80. 191 pages.

AN EXPERIMENTAL INVESTIGATION OF SOME PSYCHOLOGICAL FUNCTIONS IN DETECTION OF BRAIN DAMAGE

(L. C. Card No. Mic 58-7410)

Jerome Daniel Schein, Ph.D. University of Minnesota, 1958

An on-going sample of patients admitted to the neurology and psychiatry services of a VA GM&S hospital were tested with the Continuous Performance Test (CPT) and the Archimedes spiral. For the latter test, two dependent variables were considered: the duration of the negative after-image and the number of failures to report an after-image.

The use of the duration of the spiral after-image in differential diagnosis was not supported by the results obtained in this investigation. There were no significant differences between brain-damaged, psychotic, neurotic, nor hospitalized normal groups in average duration of the after-image.

Differences across all diagnostic groups were noted in the duration of the after-image following 15 sec. as opposed to 30 sec. stimulation by the rotating spiral. The 30 sec. stimulation period affected a significantly longer after-image duration than the 15 sec. period.

The number of failures to report any after-image did significantly differentiate the brain-damaged from the other patient groups. An explanation of this finding, in the face of the failure of after-image duration to be significantly related to brain-injury, was made in terms of a defect in verbal behavior.

The CPT significantly differentiated the brain-injured patients from the other groups. However, the differences between cortical and subcortical brain-damaged patients and psychotics were not significant. It was suggested that the fact that all of the psychotics were on ataractic medication may in part account for this result.

A comparison of performance on the CPT with EEG tracings confirmed the hypothesis that patients with diffuse EEGs would obtain lower scores than patients with focal or normal EEGs.

The effects of drugs on performance in either of the two tests was not demonstrated. It was contended that lack of control of dosage, type of drug, and length of time between testing and drug ingestion would account for this negative result.

Both tests appeared to have sizeable reliabilities when determined by internal consistency measures. For the spiral, total duration following the 15-sec. stimulation periods correlated with the 30-sec. stimulation periods at .838. The odd-even reliability of the AX-A score on the CPT was .958.

The concurrent use of the two tests was considered with reservations concerning cross-validation and size of sample having been noted. The two tests jointly identified 5% of the cases tested with 100% accuracy.

The failure of the duration of the spiral after-image to be significantly shorter for the brain-damaged patients casts serious doubt on theories of brain functioning which postulate an increase in cortical inhibition or a decrease in cortical efficiency as accompanying brain injury.

The findings for the CPT were related to those of other researchers who found that a tendency not to respond is characteristic of some brain-damaged patients. This was

in turn related to the failure to respond in the spiral afterimage test. Taken together, the suggestion was advanced that some brain-damaged patients tend to become overcautious, in the sense of restricting commerce with an uncertain environment.

Microfilm \$2.20; Xerox \$7.60. 465 pages.

COGNITIVE AND PERSONALITY DIFFERENCES IN 'ORALITY' BETWEEN SUCCESSFUL AND DISABLED READERS

(L. C. Card No. Mic 58-7241)

George Walker Shultis, Ph.D. Syracuse University, 1958

STATEMENT OF THE PROBLEM

This study attempted to investigate whether differences in 'orality' would distinguish disabled and normal readers in respect to (1) cognitive behavior, (2) personality, and (3) feeding experiences in infancy.

BACKGROUND

A review of the literature pertinent to reading disability was undertaken to compile and compare existing opinions as to the physical and emotional characteristics of disabled readers. Personality studies have described poor readers as infantile, dependent and withdrawn. Case study methods have sometimes described poor readers as having difficulty in handling aggression, with guilt and anxiety over hostile destructive or sadistic impulses and fantasies, frequently oral in form. A theoretical relationship between oral problems and reading disability has been postulated in view of the overlapping use of physical structures for taking nourishment and learning to read.

PROCEDURE

The sample for this investigation consisted of thirty matched pairs of fourth grade pupils. Subjects were matched for sex, age, and I.Q., but one member of each pair was retarded in reading 25 per cent or more from expected grade level.

Instruments were devised to sample three aspects of cognitive behavior including immediate memory, associative thinking and concept formation. Tasks were constructed to allow the possibility of 'oral' solutions. Instruments included a Memory-for-Objects Test, a modified Word-Association Test and an Object-Sorting Test.

A fourth instrument, a Thematic Test, was utilized to obtain 'oral' personality characteristics. Themas were scored on five scales: (a) Oral Eroticism, (b) Oral Aversion, (c) Oral Sadism, (d) Oral Supply, and (e) Oral Pressures from Parents.

The first four instruments were administered to each child in the sample, while a fifth instrument called a Feeding Questionnaire solicited developmental data regarding infancy from the parents.

FINDINGS

The performance of the poor readers showed a significantly greater dependence on 'oral' solutions for the cognitive tasks of associative thinking and concept-formation. In respect to immediate memory, a non-significant difference in the opposite direction than predicted was noted. Good readers recalled a significantly greater number of 'consumable items.' No difference between poor and good readers was found in respect to interest in oral activity (Oral Eroticism), but poor readers significantly differed in their greater tendency to reject food (Oral Aversion). A significantly greater degree of Oral Sadism was displayed by the poor reading group. In regard to parentchild interaction variables of Oral Supply and Oral Pressures by Parents, substantially alike scores were obtained for both groups. Parents of poor and good readers were perceived equally willing to provide food, and neither parent group appeared more pressuring or forcing around oral activity.

The feeding questionnaire failed to reveal significant differences in infant feeding experiences between the two groups.

CONCLUSIONS

A factor of 'orality' entered into the solutions of cognitive tasks such as might be required in learning to read. The oral personality of low readers showed greater oral sadism, and a neurotic-like avoidance of food. This relationship appeared more complicated than originally supposed. None of the observed differences were explainable in terms of the background data obtained in response to the Feeding Questionnaire.

SUGGESTIONS FOR FURTHER STUDY

Study should be directed to an investigation of the effect of inclusion of oral material in learning tasks presented to children with different oral response tendencies. Further research might also help to determine whether the findings represent motivational differences or reflect personality disturbances. Should the experiment be repeated, a more exacting approach to the study of background factors should be made. Thus it might be determined whether the displayed differences in oral tendencies are actually due to infant disturbances in feeding.

Microfilm \$2.05; Xerox \$7.20. 154 pages.

TIME ON PERCEPTION OF THE NEGATIVE
SPIRAL AFTEREFFECT IN BRAIN DAMAGED AND
NON-BRAIN DAMAGED SUBJECTS

(L. C. Card No. Mic 58-3757)

Ronald M. Sindberg, Ph.D. Duke University, 1958

Supervisor: Gregory A. Kimble

This study was designed to investigate the effects of certain stimulus variables upon perception of the spiral aftereffect. Because of conflicting reports in the literature concerning the value of the spiral aftereffect as an indicator of brain damage, another objective was to determine optimal conditions for such diagnostic purposes.

A 920 degree Archimedes spiral was presented to subjects in a series of trials containing all combinations of 18 and 54 R.P.M rotation speeds, 10 and 30 second exposure times, and clockwise and counter-clockwise rotations. One additional trial in each direction was given at 90 R.P.M. with a 30 second exposure time, approximating the conditions used by other investigators. Trials were presented in a fixed order of decreasing difficulty, as determined in a preliminary study.

The subjects were 50 patients with cortical damage, 50 psychiatric patients with no known or suspected brain damage, 30 patients with questionable organic damage, and 50 college students. The patient groups were equated for age, educational level, and length of hospitalization. Because instructions were designed to encourage report of the aftereffect and an inquiry was conducted after the regular series of trials, it is felt that subjects who failed to report the effect did so because of an actual inability to perceive it.

It was found that during rotation of the spiral the patient groups reported apparent size and/or depth changes with approximately equal frequency. The students reported such effects slightly more often, and reported impressions of depth significantly more often. The patient groups did not differ in this latter respect.

Forty-four of the 50 Cortical Damage patients reported the aftereffect fewer than six times in 10 trials, while only four of the 50 NP Controls did likewise. A cut-off score of six, therefore, correctly identifies 90 of the 100 subjects in the two patient groups. Three of the four NP Control patients thus misclassified are over 60 years of age, raising the possibility of undiagnosed organicity, which is frequent in such patients. The six misclassified Cortical Damage patients tend to have very mild and localized damage, and show little or no clinical impairment.

Age (except possibly for the NP Controls over 60) and location of damage seem to have little effect on perception of the negative spiral aftereffect among the subjects of this study. Amount of damage, however, is important. Small, focal lesions anywhere in the brain have little effect upon this perception, while extensive and/or severe damage markedly reduces the probability of report of the aftereffect.

Analyses of variance indicated that the effects of exposure time and rotation speed were significant for all groups, while direction of rotation was a significant variable only for the non-organic groups. Conditions of medium difficulty, such as a combination of 18 R.P.M., 30 second exposure, and clockwise rotation, discriminated best between the patient groups, while the conditions similar to those of previous investigations (90 R.P.M., 30 second exposure) were the least discriminating.

It was concluded that a theory such as that of Michael Wertheimer, which accounts for differences in perceptual aftereffects in terms of general modifiability of cortical conductivity, could best handle the results of this study.

Microfilm \$2.00; Xerox \$4.60. 90 pages.

PROGRAM ON THE INTELLECTUAL FUNCTIONING
OF PARANOID SCHIZOPHRENICS

(L. C. Card No. Mic 59-647)

George M. Singer, Ph.D. Temple University, 1958

Studies which have so far investigated the effects of tranquilizing drugs upon the behavior of psychiatric patients have, in the main, indicated the utility of these drugs as therapeutic agents in the treatment of chronic schizophrenia. Variation in the results of these studies, along with criticism of their experimental methodology, has focused attention on the need for more rigorous and specific investigations. Such an investigation is here reported in a study of the effects of the tranquilizing drug, promazine, and a total-push program on chronic paranoid schizophrenic patients, as reflected by changes in intellectual functioning.

Whenever chemotherapy is weighed for its effectiveness in treating the psychiatric patient, the question is raised regarding the conditions under which the drug was administered. Is the patient responding to the drug, or the conditions, or both? By deliberately accentuating all secondary sources of psychological and physical stimulation through a total-push or high activity program, this study attempts to show the effects of a therapeutic environment compared to an inactive, custodial one, on promazine treated patients.

The experimental design employed the "double-blind" technique commonly used in psychiatric, chemotherapy research. This technique uses a placebo group as a control for the experimental drug group, with the presumption that neither the subjects nor the personnel have knowledge of which subjects receive placebo or drug. Since tranquilizing drugs have an initial, temporary, hypnotic effect, readily observed, this technique has consistently failed in its intended control. The currently reported study utilized the barbiturate, secobarbital, to approximate in the placebo group the drowsiness manifested in the promazine group. When the drowsiness in the promazine group disappeared, by the end of the first three weeks, the secobarbital administered to the placebo group was replaced by an inert, non-reactive preparation for the balance of the study.

The subjects of the study were sixty-four selected chronic paranoid schizophrenic male patients residing in a state mental hospital. Half of that number were transferred to a custodial building housing 550 patients, where the subjects were integrated with the rest of the building population and continued to undergo routine custodial care, called in this study: low activity. The other half of the sample was transferred to a special experimental ward where they underwent a total-push or high activity program. Each of these activity groups, low and high, were divided into two equal groups, one of which received placebo, the other receiving promazine. The resulting experimental conditions were, Group A: placebo and low activity; Group B: promazine and low activity; Group C: placebo and high activity; and Group D: promazine and high activity.

The intellectual functions investigated were those measured by the Wechsler Adult Intelligence Scale and a Rigidity Test designed by the author. The tests were

administered prior to the inception of the experimental conditions, and repeated at the end of the study, a period of three months.

The hypotheses which this study was designed to test were, in summary, that promazine alone, or the high activity program alone, would have a positive influence on the intellectual functioning of chronic paranoid schizophrenic patients, and that both treatment modalities combined would have a greater positive influence than either one singly.

The results observed among the Rigidity Test variables of perseveration, adaptability, and fluidity, and in the WAIS Full Scale and Verbal Scale measures, failed to confirm the hypotheses concerning promazine alone or in combination with the high activity program. The hypothesis concerning the ability of the high activity program alone to induce improvement in the intellectual functioning of the patients received moderate support, as reflected in the results of the WAIS Performance Scale and especially the Picture Arrangement subtest.

At least insofar as the chronic paranoid schizophrenic population is concerned and under the experimental conditions of this study, promazine can be said to have been ineffective in dealing with the condition of disturbed or disordered thinking as reflected by the measures used. The findings do however, give some support to the idea that a positive, constructive ward program may have beneficial effects on chronic paranoid schizophrenics.

Microfilm \$2.00; Xerox \$5.40. 107 pages.

THE INFLUENCE OF THE SEX OF THE THERAPIST
AND OF THE CO-THERAPIST TECHNIQUE IN
GROUP PSYCHOTHERAPY WITH GIRLS:
AN INVESTIGATION OF THE EFFECTIVENESS OF
GROUP PSYCHOTHERAPY WITH EIGHTH GRADE,
BEHAVIOR-PROBLEM GIRLS, COMPARING
RESULTS ACHIEVED BY A MALE THERAPIST,
BY A FEMALE THERAPIST, AND BY THE TWO
THERAPISTS IN COMBINATION

(L. C. Card No. Mic 58-5886)

Ethel Janes Staples, Ph.D. New York University, 1958

Chairman: Professor Brian E. Tomlinson

The purpose of this study was to evaluate differences in progress made by four groups of behavior-problem girls in school. Of these, three groups were provided with group psychotherapy experiences under the guidance of a female therapist alone (F Group), a male therapist (M Group), and by the two therapists in combination (MF Group). The fourth was the control group (C Group), which was used for comparison and which followed the usual school program without any group discussion.

The subjects were twenty-four eighth grade girls of middle or upper-middle socio-economic status in a public junior-senior high school. They were assigned at random to one of the above-mentioned groups. Therapy groups engaged in twenty weekly periods of discussion, lasting forty-five minutes each.

Pre- and post-therapy measurements were undertaken

of the subjects' I. Q. scores; achievement levels in reading comprehension and arithmetic; overt behavior, conscious attitude toward school. Two psychologists rated changes in the degree of emotional disturbance found in certain of the subjects' attitudes, based upon the girls' responses in two projective tests, the Modified Sacks Sentence Completion Test and the Figure-Drawing-and-Tell-a-Story Test. Intragroup comparisons of pre- and post-therapy measurements were made with the test for correlated samples and intergroup comparisons with the non-parametric Median Test.

According to teachers' ratings, the C Group moved some in the direction of improvement, but not markedly. However, a significant deterioration of arithmetic scores was noted for this group.

The MF Group suffered deterioration more markedly and consistently than any of the other groups. The following declines were significant: "Disinterest in School Work," "Attitude Toward Peers of the Opposite Sex," "Attitude Toward Sexual Role," "Attitude Toward School." Over-all results show this group lost more than it gained during the therapy period.

The M Group, according to the teachers' ratings in the trait constellations, showed the greatest improvement. They gained somewhat in I. Q. and Reading Comprehension scores, but deteriorated in arithmetic. However, the psychologists judged that this group deteriorated on each of the ten adjustment areas, and on the total adjustment score, this group fared worse than any other group. None of these findings was significant, but they were all in the same direction.

According to the teachers, the F Group showed improvement, most markedly in the area "Unpopularity with Children." The psychologists found a significant improvement in "Attitude Toward the Future;" the I. Q. and Reading Comprehension scores also improved. On the whole, there was more consistent evidence of improvement for this group than any other.

Based upon the quantitative and qualitative results, the investigator drew the following main conclusions which are tentative and apply only to the population and techniques employed in the study.

1. Problem-behavior eighth grade girls are not likely to improve during the school year if given no guidance or opportunity for psychotherapy.

2. The co-therapist technique is possibly injurious to the mental health of pubescent girls. It may serve to reawaken the Oedipal conflict, thus provoking old infantile defenses.

3. Group psychotherapy led by a female or a male therapist separately can be helpful in promoting behavioral changes in these girls.

4. Girls, at this age, may react in different ways to therapists of different sexes. In this study, negative transference emerged with regard to the male (father-figure) therapist, and positive transference with regard to the female (mother-figure) therapist. The implication is that this is consistent with Freudian theory.

Microfilm \$3.90; Xerox \$13.20. 303 pages.

RELATIONSHIPS AMONG INDICES OF ADJUSTMENT STATUS

(Publication No. 25,424)

Ralph Harold Tindall, Ph.D. The Ohio State University, 1952

Introduction

In reviewing psychological literature on diagnosis and therapy it was noted that groups or individuals were labeled relatively well adjusted or relatively maladjusted on the basis of a single or, at best, a few indices purporting to measure adjustment status. Summaries, such as that of Ellis of validation studies of various techniques purporting to assess adjustment, have pointed to weaknesses in using certain of these indices as independent criteria. There are in existence many specific tests and devices that have been used to establish adjustment indices. Claims for the validity of these various appraisal devices are often based upon their agreement with results obtained by using some other technique of more established usage. It was felt that if existing techniques could be categorized and representative devices under the separate techniques selected, then agreements or disagreements between these various techniques could be analyzed on a more exhaustive basis.

Since the adjustment concept itself was not at all clear, it was necessary to determine what representative writers in the field agreed upon as to the meaning of adjustment. When the essentials of the adjustment concept were determined, the first objective was to categorize the common techniques used to secure numerical indices of adjustment status. It was then necessary to select representative devices under each technique and apply them to a population consisting of individuals who varied in their adjustment status. The next objective was to compare the results obtained for agreement or disagreement among themselves. As a result of correlational analysis of these results, it was possible to reach certain conclusions in regard to the present status of the concept of adjustment. It was also possible to arrive at conclusions in regard to the use of present techniques in assessing the status of individual and group adjustment.

Methods

A review of representative writings in the field of adjustment disclosed that while there were differences in expression and terminology, there was general agreement on the nature of adjustment. In general, adjustment was described as a process covering the individual's life span and operating within a complex environmental field. The process is goal-directed behavior instituted by a need which may arise at any level within a hierarchy of needs ranging from elementary physiological tissue needs through the most complicated psychological symbolizations. The process is sustained when this goal-directed behavior meets, in a complex environmental setting, thwarting circumstances which serve to heighten tensions producing varied responses in the organism. One, or a combination of these varied responses, eventually leads to a solution response which enables the organism to attain a transitory goal that results in the reduction of that particular tension.

After determining that there was agreement in regard

what the characteristics or facets of good adjustment were. It was found that seven facets of adjustment could be delineated. There is no implication that these facets are independent or mutually exclusive. These seven facets, briefly reviewed, are: (1) maintaining an integrated personality; (2) conforming to social demands; (3) adapting to realty conditions; (4) maintaining consistency; (5) maturing with age; (6) maintaining an optimal emotional tone, and (7) contributing optimally to society through an increasing efficiency.

In the course of developing a concept of adjustment, various commonly used mechanisms of adjustment were

to the general nature of adjustment, it was necessary,

prior to taking up problems of measurement, to determine

In the course of developing a concept of adjustment, various commonly used mechanisms of adjustment were recognized. It was found that while the mechanisms themselves were well recognized (i. e. withdrawal, projection, introjection, direct attack, sublimation, etc.), there was little agreement as to a mechanism's classification per se along the adjustment continuum. Since the process of adjustment is a continuous one, since it exhibits itself against a complicated environmental background, and since it may occur at any level of a complex physiological-psychological hierarchy, the inherent difficulties of measurement were recognized.

The study was designed to examine the relationships between various techniques purporting to measure adjustment. It, therefore, was necessary to select a relatively stable and well-defined population upon which to apply the various techniques. A population consisting of all the white boys at the Ohio Soldiers' and Sailors' Orphans' Home who had reached their fourteenth birthday as of April 1, 1950, who had been in residence for at least six months, and who were not being immediately discharged appeared to be the most appropriate. The resulting population consisted of sixty-six adolescent boys who were known to vary in their adjustment status. They were found to be within the average range of ability but to be retarded slightly by school placement standards. The cultural background was somewhat below that usually considered middle class. The average boy had lived approximately six years in the orphanage. While an atypical group in some respects, the immediate environmental field was similar, and they were available for study and follow-up.

After developing a concept of adjustment and selecting a suitable population, it was necessary to examine existing techniques used to assess adjustment, categorize these, and then proceed to select representative techniques to apply under each type of technique. Five major types of techniques were found: (1) questionnaires and inventories; (2) ratings by adult judges; (3) ratings by peers; (4) adjustment indices secured by means of projective techniques, and (5) systematized direct observation. Representative techniques were chosen in each category in accordance with criteria that took into account suitability of use with the age group, systems of scoring resulting in a numerical index of adjustment, practicability of application, and differences of approach within the major type. This resulted in sixteen indices of adjustment.

It was felt necessary to secure three other indices, referred to as extraneous variables, since their effect on adjustment status was unknown. These were (a) chronological age; (b) mental age, and (c) months of residence in the institution.

In order to secure these various arrays of indices, each technique was applied to the population with the

utmost care taken to prevent bias in scoring. All protocols were identified by code numbers during the application and scoring process. Where published techniques were used, there was strict adherence to administrative directions. All techniques were applied between April, 1950, and September, 1950. Raw scores were transmuted so that high scores indicated relatively good adjustment and low scores indicated maladjustment.

Results

Characteristics of the Data. The sixteen resulting arrays were inspected for normalcy of distribution and other characteristics. Means, standard deviations, and reliabilities for each technique were reported. The outstanding characteristic of the data secured from the chosen population reveals that on several measures the mean score of the study group was considerably below the mean score of the standardization group. This implies that, while the scores of the population chosen were normally distributed as a group, they gave evidence of more maladjustment than was found in the standardization populations. It was also pointed out that the reliability coefficient of the average teacher-supervisor rating, .58, was too low to assure confidence in this particular index. It was shown that the Modified Time Sample technique supplied a range of scores too narrow to be considered very discriminative.

Relationships of adjustment indices with extraneous variables. Correlations were found between each of the sixteen arrays of adjustment indices and with each of the three arrays secured from measuring the extraneous variables. The results of these procedures were reported in detail. In general it was found that very few of these relationships were at a significant level. There were logical reasons for the few instances found.

Intercorrelations between adjustment indices. The resulting intercorrelations are reported in Table 1, page 7. In general, a positive but low correlation was found between the various arrays of adjustment indices. The median intercorrelation coefficient was found to be .228. This is sufficient to indicate just a thread of relationship between these common approaches to measurement of adjustment. The results were insufficient to support strongly a global concept of adjustment.

A closer examination of Table 1, page 7, reveals that forty-one of the one hundred and twenty intercorrelations were significant at the 1 per cent level or above. In addition, seventeen more of these intercorrelations were significant at the 5 per cent level. These facts revealed that a number of the techniques used were tapping-related processes. This lends support to the logic which argues for the existence of a global concept of adjustment. However, the lowness of these relationships and the infrequency of their occurrence detracts from the usefulness of that global concept in that it lacks general communicability. In fact, when speaking of the adjustment of a specific group or of a specific individual, it is not nearly as clear what is meant as when one speaks of the general ability level of the group or of the individual.

Certain factors appeared to be present which could account for some of the relationships found. These factors may have influenced the amount of relationship found above and beyond the matter of "adjustment." Basically, there was considerably more relationship within and between three of the major groupings. Questionnaires and inven-

TABLE 1
INTERCORRELATIONS OF ADJUSTMENT INDICES

		1							п			ш		IV		V
		2 Social Adjustment	3 Analytical Thinking	4 Confidence	5 Sociability	6 Personal Relations	7 Emotional Stability	8 Home Satisfac- tions	9 "Teachers' and Supervisor's Rating	10 Deans' Rating	11 Psychologist's Rating	12 Guess Who	13 Companion Choice	14 Rorschach	15 Incomplete Sentences	16 Time Sample
	-									-	-	-	-	-	-	-
Self Adjust- ment	1	* .663	.237	#.533	.202	#.615	#.483	#.325	#.712	*.262	#.400	#.501	#.320	*.256	#.321	*.27
Social Ad- justment ~ Analytical	2		.106	#.349	.145	#.458	#.333	#.376	#.424	*.268	*.472	*.284	*.271	#.345	#.320	.12
Thinking	3		1	#.333	*.308	.174	*.303	134	039	.132	.071	.197	.069	.107	038	09
Confidence	4			-1000	#.497	#.755	#.808	#.329	.033	.165	.214	*.259	.221	.142	.148	.00
Sociability	5					*.285	#.318	.015	087	060	.042	#.333	044	.106	.080	.02
Personal	-					-			,			-200				
Relations	6						#.788	#.381	.168	*.245	*.310	*.269	#.365	.177	.214	.12
Emotional	7							4 400	005	070	104	201	205	100	000	- 00
Stability Home Sat-	-							#.428	.007	.070	.164	.221	.235	.183	.093	.06
isfaction	8								.214	019	.197	047	.126	.200	.033	.10
"Teachers' and Super- visor's"	0								.214	-,019	,197	041	,120	.200	.033	.10
Rating	9									#.545	#.490	#.531	#.603	*.289	.099	#.45
Deans' Rat-											2.200	*,002	1,000	.200	.000	
	10										#.580	#.369	#.630	.185	.096	.16
	11									1		*.301	#.488	.112	#.363	.19
	12												#.625	*.253	.132	*.29
Companion									1				2,020			
Choice	13													#.317	.105	.21
	14														.091	08
Incomplete															.,,,,,	1
	15															09

*r = .243, .05 level of significance *r = .316, .01 level of significance

tories, ratings by adults, and ratings by peers using sociometric techniques are all established by some form of personal report, which could plausibly account for some of the relationship found. Relationships between techniques within each of these three major groupings were more frequent and at a higher level than those relationships found between the major types. Accounting for some of the relationship found might also be the fact that there was an overlap between self adjustment and social adjustment.

A study of the data brought out other factors which could logically account for some of the lack of relationship found. One of these was the lack of relationship between the two projective techniques purporting to establish an adjustment index, and another, the lack of relationship found when these indices were compared with indices established by other techniques. At the present stage of refinement, these projective techniques were found useful in constructing hypotheses in regard to individual behavior dynamics, but their use did not result in comparable numerical scores when compared to the other measures of adjustment. By including the Modified Time Sample Index, which was related at the .01 per cent level of significance to only one of the other fifteen indices, the number of significant relationships was reduced.

In addition to studying the relationships between arrays of various adjustment indices, a detailed study of five individual cases was made. These cases were selected according to several criteria, the most important being that two of them evidence relatively high scores in the self adjustment area and in the social adjustment area. Similarly, two were to evidence low scores in these areas and the fifth was to show discrepancy between scores in these areas. By using standard scores, it was possible to compare all indices with behavioral, psychological, and historical data. This individual case study supported the hypothesis that scores of self adjustment and social adjustment were fruitful screening devices. Individual discrepancy between the various techniques for measuring adjustment could, in the majority of cases, be explained

on the basis of the detailed case history. It was clearly indicated that no one score taken alone could be depended upon to assess adequately adjustment in an individual case.

Conclusions

(1) The data secured in this study seem to indicate that techniques purporting to appraise adjustment status when applied to the same population do not produce results that are closely related. This would imply that a global concept of adjustment is limited in usefulness.

(2) Criteria studies, where claims are made in regard to change in adjustment status, should report several indices of adjustment. If it can be shown that there has been a significant change brought about in "adjustment" as measured by various techniques, more confidence can be placed in those results.

(3) It has been pointed out that there is a need for clearer definitions within the concept of adjustment. In our culture there seem to be certain common situations that should lend themselves to more precise definition in terms of behavior that could be agreed upon as to position on an adjustment-maladjustment continuum.

(4) Differences between techniques, within the same general type of adjustment assessing measures, point out the need for refinement of present techniques. The addition of more and more varieties of adjustment assessing techniques, validated through comparison with results established by existing techniques, serves to complicate rather than clarify the existing situations.

(5) For the best use of existing techniques, the results of this study appear to indicate using many instead of one or a few indices before general conclusions regarding adjustment status are drawn. Results secured should be checked with actual behavior manifestations. A self adjustment index and a peer rating are useful screening techniques.

Microfilm \$5.55; Xerox \$19.60. 434 pages. Mic 59-936.

1. Ellis, Albert. "The Validity of Personality Questionnaires," Psychol. Bull., 43 (1946), pp. 385-440.

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HUMOR AND PERSONALITY: A STUDY OF THE RELATIONSHIP BETWEEN CERTAIN SELECTED ASPECTS OF PERSONALITY AND THE PREFERENCE FOR AGGRESSIVE OR NON-AGGRESSIVE WRITTEN HUMOR

(L. C. Card No. Mic 58-5887)

Bertram Vogel, Ph.D. New York University, 1958

Chairman: Professor Edward L. Kemp

It was the purpose of this study to investigate the relationship between selected major aspects of personality and the preference for aggressive or non-aggressive written humor. For the attainment of that purpose, the investigator attempted to determine the individual's preference for aggressive or non-aggressive humor, to evaluate the individual's personality by objective means, and to analyze the relationship between personality and humor preference.

The sample consisted of 100 New York University undergraduate students -- 40 men and 60 women.

In order to determine the individual's preference for aggressive or non-aggressive written humor, the investigator devised a humor inventory consisting of 30 "humorous" items equally divided into three categories: non-aggressive, slightly aggressive, and highly aggressive. These 30 jokes had been selected from 124 items on the basis of independent ratings for degree of aggression by nine psychologists, psychiatrists, and psychoanalysts, and for "funniness" by 30 subjects randomly drawn from the population ultimately studied.

Respondents to the humor inventory were instructed to circle the 10 "most amusing" items. A Humor Aggression Score (HAS) was obtained by assigning a weight of zero to each non-aggressive item, a weight of one to each slightly aggressive item, and a weight of two to each highly aggressive item. The total weight for the 10 items circled by each respondent constituted his HAS.

The Edwards Personal Preference Schedule was utilized for the assessment of personality. This inventory, a forced-choice instrument, consists of 225 paired items intended to measure 15 relatively independent personality variables.

Both the humor inventory and the Edwards Personal Preference Schedule were administered by the investigator either in formal classrooms or in special rooms made available for this research. The humor inventory preceded the Edwards scale.

The following major conclusions are presented for consideration:

The coefficient of equivalence obtained by the paralleltest method (= .82), employing an alternate humor inventory constructed in the same manner as the original form, would suggest that the reliability of the humor inventory was sufficiently high both to meet the requirements of the exploratory investigation undertaken and to offer considerable promise for the development of a refined and useful instrument during the future.

There was no significant difference between the means of scores obtained by college men and those obtained by college women on the humor inventory.

Although the data support the hypothesis that the preference for aggressive or non-aggressive written humor is a function of personality, significant sex differences for the coefficients of correlation between HAS and deference and HAS and dominance suggest that analysis of the homor inventory for the purpose of prediction of personality consider the sex of the individual being evaluated.

For the male population sampled, Pearson product-moment coefficients of correlation indicated a significant relationship between HAS and deference, dominance, heterosexuality, and aggression, respectively, at the .01 level of confidence. The relationship between HAS and nurturance was significant at the .05 level. Coefficients of multiple correlation indicated that the combined action of certain personality variables on HAS was highly significant at the .01 level. As a predictor of the preference for aggressive humor on the part of men, the combination of deference and heterosexuality was almost as effective as the strongest combination of any three personality variables.

For the female population sampled, there was a significant relationship between HAS and aggression at the

.01 level of confidence. The relationships between HAS and nurturance and HAS and heterosexuality were significant at the .05 level. The combination of the three personality variables constituted the most effective predictor of HAS. Nurturance and aggression together, however, proved to be a better predictor of HAS than heterosexuality and aggression together.

For the total group, the relationships between HAS and aggression, heterosexuality, deference, nurturance, and dominance, respectively, were all significant. The relationships between HAS and abasement, intraception, achievement, and exhibition, respectively, which were slightly short of significance, would seem to merit serious consideration during similar research in the future.

Microfilm \$2.00; Xerox \$4.80. 95 pages.

CHANGES IN FINE-MOTOR PERFORMANCE
INDUCED BY DRUG THERAPY AND A HIGH
ACTIVITY WARD PROGRAM: AN INVESTIGATION
OF THE EFFECTS OF A TRANQUILIZING DRUG,
PROMAZINE HYDROCHLORIDE, UPON THE
FINE-MOTOR FUNCTIONS OF HOSPITALIZED
MALE CHRONIC PARANOID SCHIZOPHRENICS UNDER
A HIGH AND LOW ACTIVITY WARD PROGRAM

(L. C. Card No. Mic 58-7626)

Bernard S. Weinman, Ph.D. New York University, 1958

Chairman: Professor Roscoe C. Brown

The purpose of the study was to determine the effects of a tranquilizing drug, promazine hydrochloride, upon the fine motor functions of hospitalized chronic male paranoid schizophrenics under a high and low ward program. The areas of motor performance investigated were simple visual reaction time, speed of tapping, manual dexterity, armhand steadiness, and aiming. The relationship between changes in fine motor performance and changes in psychiatric condition also was investigated.

The hypotheses of this study derive from studies indicating that tranquilizing medication induces mild improvement in chronic schizophrenics and studies demonstrating the effectiveness of ward programs in rehabilitating the psychotic patient. Psychomotor performance was selected as a criterion for psychiatric rehabilitation because studies dealing with the psychomotor aspects of mental illness have demonstrated the general impairment of fine motor functions in schizophrenics. Findings in this area have shown that concomitant reductions and improvement in performance accompany the severity of the illness, the response to treatment, and the remission from schizophrenia.

These hypotheses state that in regard to the chronic paranoid schizophrenic patient: (1) promazine hydrochloride therapy would enhance fine motor performance, (2) the high activity program would enhance fine motor performance, and (3) the combination of promazine hydrochloride therapy with the high activity program would enhance fine motor performance to a greater degree than either of the two therapies used individually. It was further hypothesized that if changes occurred in fine motor performance and in psychiatric condition, they would be positively related.

A randomly selected population of chronic paranoid schizophrenics, whose average age and duration of hospitalization was 46.8 years and 13.0 years respectively, was divided randomly into four groups who received the following differential treatment: promazine hydrochloride and a high activity program, a placebo and a high activity program, promazine hydrochloride and a low activity program, and a placebo and a low activity program, and a placebo and a low activity program. During the three month treatment period, the daily dosage of promazine hydrochloride was increased progressively from 200 mgm to 1,000 mgm. Control procedures were instituted to make this a double blind study.

The patients who were examined within a six week period before and after treatment, remained on their respective placebo or maintainance drug dosage until testing was completed. The instruments used were a simple visual reaction time apparatus, a Whipple Tapping Board, the Minnesota Rate of Manipulation Placing Test, The Purdue Pegboard Pin-Placing Test, a standard steadiness test apparatus, The MacQuarrie Dotting Test, and the Wittenborn Psychiatric Rating Scales.

The four treatment groups differed significantly in performance on one of the six fine motor tests - the Purdue Pegboard. On this test the placebo, high activity group showed significantly greater improvement in performance than the drug, high activity group and the placebo, low activity group.

The conclusions of the study were as follows. The fine motor performance of chronic schizophrenic patients (1) is not enhanced by promazine hydrochloride therapy and a low activity program, (2) is enhanced significantly only in the area of finger dexterity by a high activity program alone, in contrast to a low activity program alone, and in contrast to a combination of promazine hydrochloride therapy and a high activity program, (3) is not enhanced by a combination of promazine hydrochloride therapy and a high activity program.

The hypothesis regarding the relationship between changes in fine-motor performance and psychiatric condition was untestable because of the absence of change in any of the four treatment groups on the psychiatric rating scale.

Microfilm \$2.00; Xerox \$7.00. 146 pages.

CHLORPROMAZINE: ALONE AND AS AN ADJUNCT TO GROUP PSYCHOTHERAPY IN THE TREATMENT OF CHRONIC PARANOID AND CATATONIC SCHIZOPHRENIA

(L. C. Card No. Mic 58-2799)

Mitchell H. Wetherhorn, Ph.D. The Florida State University, 1958

Ninety patients selected for the study were divided into 3 treatment groups. Group A received chlorpromazine and group psychotherapy. Group B received chlorpromazine alone. Group C received a chlorpromazine placebo. Groups B and C also received an active placebo of 50 mg. nicotinic acid making identification of the drug group more difficult. The daily drug dose of chlorpromazine was 250 mg. Group A was divided into 3 groups of 10 each, which met 3 times per week for sessions of $1\frac{1}{2}$ hours duration. The therapy program lasted a period of 9 months.

The criteria measures employed to ascertain change were the Minnesota Multiphasic Personality Inventory, the Fergus Falls Behavioral Rating Scale, and the Wittenborn Psychiatric Rating Scales.

Group C became more anxious, phobic-compulsive, depressed, and less communicative. Chlorpromazine produced a therapeutic effect but much more limited than reported by other investigators. The drug results in a limited improvement in social adaptation within the hospital. Overt symptoms of schizophrenic excitability and hebephrenia were reduced. It was also noted that the drug patients displayed markedly less paranoid thinking and hypo-chondriacal concern. The drug group was significantly more symptomatically depressed. This symptomatic depression, characterized by lassitude and psychomotor retardation was noted on the Wittenborn scale and not on the MMPI. Therefore it appears to be a drug induced "artifact depression". The drug appears to assist the patient in mobilizing defenses. Group A made the greatest improvement. These patients manifested a much improved hospital adjustment, improving on all of the Fergus scales except scale K. They were behaviorally less schizophrenic and less depressed. This reduction is schizophrenic behavior and psychological as well as overt. Reduction on the schizophrenia scale of the MMPI was significantly greater than produced by the drug alone. This result does not appear to have been achieved by a defensive-denying mechanism as in the case of the drug alone group.

Results of the study lead to the conclusions: (1) Combination therapy of chlorpromazine and group psychotherapy is a more efficacious method for treating chronic schizophrenia than is the method of using the drug alone or treatment by placebo; (2) the use of chlorpromazine induces more favorable changes in chronic schizophrenic patients than is produced by the use of a placebo; (3) while many favorable changes were noted in the combined treatment patients and while approximately one-third were able to leave the hospital, the results obtained were not as successful as claimed by some investigators; (4) the previous reports of marked success in the treatment of schizophrenia by chlorpromazine therapy appear grossly exaggerated.

Microfilm \$2.00; Xerox \$3.00. 43 pages.

AN EXPLORATORY STUDY OF THE EFFECTIVENESS OF A COMPOSITE PROJECTIVE GROUP TEST FOR CHILDREN

(L. C. Card No. Mic 58-7998)

Marjorie Hucker Williamson, Ph.D. Purdue University, 1958

Major Professor: Lawrence M. Baker

This study was undertaken to explore the feasibility of developing for use as a screening device with preadolescent children a test battery composed of sub-tests based upon a variety of projective stimuli. An experimental test instrument, called The Composite Projective Test, was created. The test consisted of the following nine sub-tests: Draw-an-Elephant; Rorschach; Bender-Gestalt; Picture Cards; Draw-a-Person; Coding; Structured Story; Ac-

tivities Sheet; and Sentence Completion. Scoring systems and rating scales were developed to provide an objective basis for evaluating the data.

The Composite Projective Test was administered to eighty school children in Grades three through eight who were known to be well-adjusted or maladjusted. The children in the maladjusted group were children referred to the school psychologist for individual diagnostic study because of real emotional and/or learning problems. The normal children were classmates of the referred children. The experimental design used was one of matched pairs. The pairs of normal and maladjusted children were matched on the basis of age, sex, intelligence level, educational level of parents, occupational level of father, presence or absence of siblings in the home and the religious affiliation of the family. The individual pairs of children were tested simultaneously and it was the examiner's first contact with each child.

The data from the individual sub-tests were analyzed and all parts of each test were required to demonstrate a certain level of statistical significance before being included in the computation of the total battery score. The t-technique was used to test the significance of the differences. In testing the differences between the two groups in terms of total score, a matched t of 6.43 and an unmatched t of 6.08 were obtained, indicating a high level of significance. The original hypothesis that a composite projective battery would differentiate between the normal and maladjusted groups is, therefore, supported.

The implications of these findings and suggestions for

further research are offered.

Microfilm \$2.00; Xerox \$5.20. 101 pages.

AN INVESTIGATION OF THE RELATIONSHIP AMONG TRANSFERENCE, EGO STRENGTH AND AGE IN ELEMENTARY SCHOOL BOYS

(L. C. Card No. Mic 58-7627)

Carl M. Winston, Ph.D. New York University, 1958

Chairman: Professor Brian Tomlinson

The purpose of this investigation was to study the transference feelings of boys towards teachers at three age levels and to determine the relationship between the degree of transference evidenced and that aspect of personality known as ego-strength. The study was designed to test the hypothesis that with increasing age elementary school boys show a decreasing amount of transference and that those children with a greater degree of ego-strength would show fewer transference feelings regardless of age.

The population consisted of 120 elementary school boys. Forty subjects were selected from the second grade, forty from the fourth grade and forty from the sixth grade. The children were selected on the basis of good adjustment in social, emotional and academic areas. The three groups were equated as to the following five categories: intelligence, school achievement in reading, school achievement in arithmetic, number of siblings and occupational category of father. The subjects were drawn from two large elementary schools in a middle class

socio-economic area on the south shore of Nassau County.

A Test of Transference, designed by the investigator, was administered to each child. The test was validated for the purposes of this investigation in a Pilot Study. The first part of the test consisted of 25 cartoons, ten depicted a familiar classroom situation and for each of these a picture was included to show the same type of situation in the home. The second portion of the Test of Transference consisted of 30 incomplete sentences. Ten sentences dealt with the teacher and ten similar ones dealt with the mother. Responses were scored for the pairs of matched situations in the picture test and the sentence test. The scoring categories were 1) Identical where the subjects' response to both pictures or sentences of a pair were exactly the same 2) Similar where there is some similarity in feelings, attitudes and expectations, and 3) Different where there was a complete difference in the two responses.

A measure of ego-strength was obtained by the use of the Rorschach Prognostic Rating Scale. The Rorschach Test upon which this scale of ego-strength is based was given to the upper ten and lower ten subjects on the transference scale at each of the three grade levels. This scale yielded a single total score for ego-strength and six subtest scores for separate areas of ego-strength.

Findings on the several measures were subjected to statistical analysis through analysis of variance and point biserial correlation.

Based upon the population studied, the following conclusions were drawn:

1. Measures of transference can be obtained for groups of boys at varying age levels. Within each group a large range of transference was obtained.

2. Transference decreases with increasing age. The youngest age group showed the largest amount of transference followed by the middle age group. The oldest age group showed the least amount of transference.

3. No evidence was found for a significant difference in the amount of ego-strength among the age groups. This was also the case when the partial measures of ego-strength were studied. This may be a result of the insensitivity of the test used to measure this personality characteristic.

4. There was no evidence of a significant relationship for ego-strength and high or low transference scores at each age level.

5. No significant correlation was found between the measures of transference and ego-strength at each age level or for all age levels combined. A trend in terms of the direction of relationship was noted. At the youngest age group a positive correlation was obtained indicating a relationship between high transference and high ego-strength. This trend was reversed at the upper two age groups.

Microfilm \$2.35; Xerox \$8.20. 180 pages.

A TEST OF THE FORM-COLOR INCONGRUITY HYPOTHESIS

(L. C. Card No. Mic 59-191)

Milton Wolpin, Ph.D. University of Pittsburgh, 1958

This experiment tested the form-color incongruity hypothesis developed by Siipola and by Bruner and Postman. In essence, "congruity" refers to a situation where the form of a stimulus tends to evoke a given response, or association, and the color of the stimulus is appropriate to this same association. "Incongruity" refers to a situation where the form tends to evoke a given association, and the color is "incongruous", or inappropriate to this association.

The form-color incongruity hypothesis suggests that such incongruity leads to response "difficulty", manifested in various ways. Specifically the present experiment tested three hypotheses related to the effect of incongruity; (1) reaction-time in giving a response increases; (2) variability of response content increases; and (3) verbalized attention to color increases.

Two corallary hypotheses were tested: (a) previous experience with incongruity reduces the effect of incongruity and (b) "set", or instructions minimizing the importance of color in the task, decreases the effect of incongruity. In testing all hypotheses, the effect of incongruity was compared with the effect of control stimuli where form and color were congruous.

The stimuli used in each of the experimental conditions were a series of ink-blot details copied from the standard Rorschach cards. Each detail selected was of an area that was associated with a "popular" (very frequently given) response. On the basis of the most frequently elicited response for each detail (according to Beck's norms) the blots were colored either congruously or incongruously. These relatively unstructured ink-blot stimuli were used because previous experiments, using similar stimuli, are the ones where results have been inconclusive; and because the experimental studies of form-color incongruity have developed, in part, as an attempt to clarify the descriptive concept of "color-shock", or "neurotic-shock", in interpretation of the Rorschach ink-blot procedure.

A total of 204 female undergraduate students, ranging in age from 17 to 22, were shown these blots. There were four conditions; one for a control group and one for each of the independent variables. Each subject served in one condition; there were 51 subjects per condition. The four conditions were:

(I) Three congruous (set stimuli) followed by three congruously colored stimuli (test stimuli).

(II) Three congruous followed by three incongruously colored stimuli.

(III) Three incongruous followed by three incongruously colored stimuli.

(IV) Three congruous followed by three incongruously colored stimuli. Instructions were altered to change the set.

Measures used were: (a) reaction-time; (b) variability of content; and (c) use of color.

The results do not support the hypothesis that incongruity leads to an increase in reaction-time. There is an interaction between reaction-time, congruity, and the

occurrence of popular responses which is not confirmed on analysis of the pre-test stimuli.

Incongruous stimuli, under all conditions, show the predicted increase in variability of content and in use of color. Thus two of the three major hypotheses are supported indicating that incongruous stimuli lead to different reactions as compared to congruous stimuli.

In general the two sub-hypotheses, in respect to (a) previous experience with incongruity and (b) altered instructions, were not confirmed. The only positive finding is that the use of color, following previous experience with incongruity, does diminish.

In conclusion, it appears that the "disruption" effect depends to a considerable extent on the kinds of stimuli used. The stimuli in this experiment are considerably different, especially in regard to ambiguity, from those used by Bruner and Postman. In addition while it may be that "color-shock" on the Rorschach is a function of incongruity, it appears likely that other factors may be equally or more important.

Microfilm \$2.00; Xerox \$4.20. 77 pages.

AN ATTEMPT TO CHANGE WORD MEANING AND A PERSONALITY TEST SCORE THROUGH SEMANTIC GENERALIZATION

(L. C. Card No. Mic 59-42)

Bernard Yadoff, Ph.D. University of Pittsburgh, 1958

This study was designed to investigate some of the parameters of semantic generalization. The purpose was to bring about a mediated change in the meanings of the words Endurance and Persistence and also cause a change in the need Endurance score on a personality test. The method used involved repeated reinforcements for the pairing of synonyms or antonyms of endurance with positive or negative evaluative words.

Subjects were college undergraduates, randomly assigned to one of four experimental groups and a control group, 20 subjects to a group. The scale used to measure word meaning was the Semantic Differential (SD). Seven abstract nouns (Anticipation, Endurance, Sympathy, Orderliness, Achievement, Persistence, and Boredom) were rated as to connotative meaning along nine bipolar scales. Three of the scales were heavily loaded on the evaluative factor, three on the potency factor, and the other three on the activity factor.

Two abbreviated fifty-item forms of the Personality Preference Schedule (PPS) were constructed, measuring, in addition to need Endurance, the traits need Order, need Succorance, and need Achievement. Each trait was measured by 11 items. The three items on each scale which necessitated a choice between the trait being scored and the other three traits were not scored. The subjects in half of each group were given one of the forms first, while the other half were given the other form first.

The same five endurance synonym-antonym pairs were used for all experimental groups: "unceasing-pausing," "continue-cease," "concentrate-daydream," "completed-unfinished," and "singleminded-distractible." Each pair was printed at the bottom of a 3 x 5 card, with a positive

("good," "reward," "approve," "right") or negative ("bad," "punish," "disapprove," "wrong") evaluative word at the top. There were thus 20 different cards (four evaluative words times five pairs) per group with another 20 cards being used to counterbalance the left-right placement of the synonym-antonym pairs.

Each subject paired an endurance synonym or antonym and read the two words aloud. They were informed by the experimenter (who was screened from their view) whether each pairing was "Right" or "Wrong." The criterion for learning was five perfect trials in succession (of the 40 cards), that is, 200 successive correct responses.

Group I subjects were reinforced for pairing endurance synonyms with positive evaluative words, while those in Group II were told "Right" when they paired endurance antonyms with negative evaluative words. The prediction was that the words Endurance and Persistence would be rated more towards the positive end of the SD evaluative factor on the posttest, and that the need Endurance score on the PPS would be raised.

For Group III subjects, the correct response involved the pairing of endurance antonyms with positive evaluative words, and Group IV subjects were reinforced for pairing endurance synonyms with negative evaluative words. The predictions regarding the changes in rating of Endurance and Persistence on the SD and need Endurance on the PPS were the converse of the ones for Groups I and II.

Following the repeated reinforcements, the second form of the PPS and the same SD scales were administered. Control group subjects were given just these two tests. At the end all subjects were given two insight questionnaires.

The results obtained were completely negative, with no groups showing any systematic changes on either of the dependent variables. The reason for this was felt to lie in the personal values and culturally determined meanings of the words chosen. Possible alternative methods of testing the basic hypothesis were discussed, since the basic assumptions underlying the study were still felt to be valid. Microfilm \$2.00; Xerox \$3.60. 64 pages.

PSYCHOLOGY, EXPERIMENTAL

CONCEPT FORMATION AND GENERALIZATION AS A FUNCTION OF SIMILARITY AND AMOUNT OF TRAINING

(L. C. Card No. Mic 58-7443)

Raymond Dale Dick, Ph.D. University of Missouri, 1958

Supervisor: Dr. Robert S. Daniel

Eight groups of Ss were given one of four amounts of concept formation training with either high or low similarity concepts, paired with nonsense syllables of zero association value. One of ten random, flat, solid, visual forms was the prototype for ten instances of each of ten high and ten low similarity concepts. Instances of low similarity concepts represented a greater range of distortion, achieved by projection of the prototypes on a

rotated screen, than instances of high similarity concepts. After training, a generalization and a discrimination test were given. The test stimuli were deviations from the prototype forms, obtained by systematically moving the points on which the prototypes were drawn.

It was found that: (A) The rate of concept formation was faster with high than with low similarity concepts.
(B) Conceptual generalization, as such, was not influenced by degree of similarity among the instances of a concept. However, the greater conceptual response tendencies for the high similarity conditions at each amount of training, produced greater tendencies to conceptual generalization.
(C) Conceptual generalization was an increasing function of amount of training. These findings were related to Gibson's theory of verbal learning.

Microfilm \$2.00; Xerox \$4.80. 93 pages.

VARIABLES AFFECTING FIRST TRIAL PERFORMANCE IN A LINEAR RUNWAY SITUATION

(L. C. Card No. Mic 59-664)

Charles Rollin Galbrecht, Ph.D. Tulane University, 1958

Chairman: Abram Amsel

In animal learning situations involving approximately 24 hours between practice sessions and several spaced trials within each session, a phenomenon often occurs which is quite comparable to that of warm-up decrement in human learning situations and which may be called first trial decrement (ftd). This ftd is characterized by: (a) inferior performance on the first daily trial, as compared to the second and later trials; and (b) inferior performance on the first trial following rest, as compared to the last trial preceding rest. The present study was designed to investigate the effect upon ftd of two experimental variables.

The first of these was similarity of gross stimulation present during intersession and intrasession intervals. On the assumption that inferior first trial performance may reflect a need for the reinstatement of set elicited, at least in part, by gross experimental-room stimuli, the hypothesis was advanced that ftd might be decreased if some of the stimuli present during experimental sessions were also present during the longer intervals between sessions. In this way, there would not be so great a need for the reinstatement of performance set at the beginning of a practice period.

The second factor was that of pre-reward introduced immediately before the first trial of an experimental session. Since various studies have demonstrated the facilitating effect of pre-reward upon subsequent performance, it was predicted that providing an animal with a given amount of pre-reward just before the first trial of a practice session would increase performance on that trial and thereby decrease the magnitude of ftd.

Eighty hooded rats were trained to make an instrumental running response under a 20-hr. thirst drive. All Ss ran three trials per day. During 20 days of acquisition training, Ss were divided into two groups of 40 each. For

Group S the gross stimuli present within and between daily sessions were held relatively constant, but for Group D the intersession gross stimuli were different from the intrasession gross stimuli. After acquisition training, two kinds of test conditions were introduced, "switching" and pre-reward, each involving 40 Ss (20 Ss in each of the two groups).

Under the switching procedure, 10 Ss in Group D were switched to Group S, with 10 remaining in Group D, and 10 Ss in Group S were switched to Group D, with 10 remaining in Group S. Training was continued for an additional 15 days. Under the pre-reward condition, each of the other 40 Ss (those not involved in the switching procedure) was given two drops of water in the goal box immediately before a first daily trial. This condition was continued for 12 days, with each S being pre-rewarded on 6 of the 12 days.

Groups D and S demonstrated reliable ftd during acquisition training, with the phenomenon being more marked during the first several days. However, the two groups did not differ during this period with respect to magnitude of ftd. Experimental findings also failed to show any systematic effect of the switching procedure upon ftd. The influence of pre-reward upon first trial decrement remains undetermined, since the phenomenon was no longer statistically significant on either the pre-drinking or the no pre-drinking days.

Statistical analyses of starting time data were also performed. Starting time was the time taken for Ss to leave the start box of the experimental apparatus. It was found that Groups D and S demonstrated, in several instances, reliable first trial increment during acquisition training. However, under the conditions of pre-drinking and no pre-drinking, only Group S showed statistically significant first trial increment.

Microfilm \$2.00; Xerox \$3.80. 67 pages.

VOLUME INGESTED AS A FUNCTION OF DEPRIVATION, TASTE, AND NUTRITION

(L. C. Card No. Mic 58-7445)

William Allen Hillix, Ph.D. University of Missouri, 1958

Supervisor: Melvin H. Marx

Twelve groups of six female albino rats on either free feeding or a 23-hour deprivation schedule were each fed one of six solutions in 15-minute daily drinking sessions for a period of 42 days. The solutions varied as to taste and nutritive value, taste being manipulated by adding 0%, .17%, or .30% saccharin to distilled water, and nutrition being varied by adding either 0% or 5% of unflavored gelatin.

The volume consumed was a function of both taste and nutrition. The relationship between nutrition and volume consumed was apparently a function of the slight taste of the nutritive substance. Neither nutrition nor drive interacted with blocks of days, and the form of the taste interaction seemed to be based primarily on increased consumption of low taste solutions by non-deprived animals. None of the higher-order interactions involving

deprivation or taste in interaction with blocks of days were significant.

It was therefore urged that, since nutrition and drive did not interact with the days variable, long-term postingestive effects are not necessary to the maintenance of consummatory behavior for tasty solutions, even over a long period of time. Neither was nutrition alone sufficient to obtain a high level of responding.

The significant effects in this experiment were "between" effects, wherever drive or nutrition were concerned. These effects occurred immediately, apparently because of shifts in preferences related to the sensory consequences of adding a nutritive substance, or because of the action of deprivation upon preferential relations.

It was argued from these results that the consequences that occur early in the ingestive chain of events (notably taste) are at least partially independent of the terminal, nutritive, drive-reducing events. The implications of these findings for further research and for a complete theory of reinforcement were discussed.

Microfilm \$2.00; Xerox \$3.60. 65 pages.

AN ANALYSIS OF SOME RECENT FINDINGS RELATING TO THE CONTINUITY HYPOTHESIS

(L. C. Card No. Mic 59-34)

David Joseph Klaus, Ph.D. University of Pittsburgh, 1958

This study was concerned with the current status of the continuity versus noncontinuity issue. Briefly, the continuity position is that discrimination formation consists of the gradual acquisition of preferential response tendencies to the entire array of stimulus cues impinging on the organism's sensorium at the time of response. This process, according to the continuity theorists, proceeds in a mechanistic stimulus-response fashion in which the sole determinants of the behavioral outcome are assumed to be extrinsic to the organism. Noncontinuity, on the other hand, is the theory that discrimination learning proceeds only to the extent that a cognitive mechanism in the organism has selected the critical stimulus aspects out of its environment. The noncontinuity theorists contend that no differential learning can take place unless the subject is, at that moment, attempting to determine the validity of its 'hypotheses' about the appropriate cue dimension.

An extensive review of the relevant literature indicated that the predominant portion of the experimental evidence pertaining to the continuity question has been favorable to the continuity position. Of the several studies supporting noncontinuity, one type in particular was analyzed in detail so as to find possible explanations for those data which would be consistent with the continuity view. The paradigm considered was that, as measured by speed of reversal versus speed of relearning, a discrimination was unaffected by an interpolated discrimination problem even though the cues from the original discrimination were randomly paired with the positive and negative cues of the interpolated problem and even though the interpolated problem was carried through various amounts of overlearning.

Three alternative explanations were offered. Either their interpolated problem had insufficient spacing of

trials, or their overlearning procedure actually did not adequately equate for number of reinforcements to each of the two cues, or the animals formed subtle orientation responses which prevented the necessary stimulation from impinging on their sensory receptors. These three hypotheses were tested by incorporating the appropriate controls in three independent experimental groups and comparing their performance with that of a control group. While the other two experimental groups differed little from the controls, the group having had a correction for number of original reinforcements as a specific part of their procedure yielded results which were significantly different from the controls and in the direction of reduced strength of the original responses.

Although this correction did not completely eliminate the effects of the previous discrimination in that the paradigm did not permit it, there seemed to be sufficient evidence to conclude that cues do not acquire any sort of 'distinctiveness'. Instead, it was shown that all the stimuli in the situation tend to participate equally during the formation of the discrimination. Hence, it was possible to explain these findings in a way which was consistent with continuity principles.

A revised theory of continuity was then offered to explain most of the remaining evidence found in the literature which was favorable to noncontinuity. By making certain assumptions about the growth of generalization gradients during discrimination training, the primary remaining objection to continuity theory, that of the facilitation of cue reversal as a result of overlearning, was accounted for. Other problems, such as the concept of stimulus dimensions were also dealt with through use of the theory. While several of the explanations presented await future verification, it seems reasonable at this point to conclude that discrimination learning data can be adequately explained without recourse to a cognitive mechanism.

Microfilm \$2.00; Xerox \$6.00. 125 pages.

AN EXPLORATORY STUDY OF SOME PROCESSES OF THINKING WITH PHYSICALLY HANDICAPPED AND NON-PHYSICALLY HANDICAPPED CHILDREN

(L. C. Card No. Mic 58-5921)

Fred R. Mayrand, Ph.D. New York University, 1958

Chairman: Professor Howard M. Newburger

This exploratory study concerned itself with two major problems. The first was to determine the existence of relationships, if any, between such processes of thinking as perceiving, concept-formation, judging, and reasoning. The second concerned itself with the question of the probable effect of a physical handicap on the processes of thinking.

The investigators were mainly interested in what an individual does. But, what a man is, or is believed to be, was indirectly introduced by the framework within which the experimenters functioned. This framework is known as "holism," which states that there is a tendency in nature to form wholes that are more than the sum of the parts.

The study, as a whole, was directed and bound by its philosophical premises, the theoretical framework within which the investigation proceeded, and the experimental

design and methods employed.

The experimental procedure consisted of measuring the four processes of thinking in terms of responses elicited on certain test items. The test items used were the Gottschaldt Figures. The type of response desired by the experimenters was determined by specific instructions given to the subject. These instructions served as "set" and varied according to the process of thinking tested. The two values making up the independent variable were the instructions and the presence or absence of a physical handicap. The response was the dependent variable. The concomitant variations were the thinking processes.

The subjects were selected from the New York City Public Schools. The population consisted of one hundred males ranging in chronological ages from eight through fourteen years. The five experimental groups making up

this population were the following:

- Normal (in terms of I.Q.), non-physically handicapped.
- 2. Mentally-retarded (in terms of I.Q.), non-physically handicapped.
- 3. Gifted (in terms of I.Q.), non-physically handicapped.
- 4. Normal (in terms of I.Q.), physically handicapped.
- 5. Mentally-retarded (in terms of I.Q.), physically handicapped.

Results

The results indicate that, in terms of the selected subjects, experimental design, and assumptions made, there is a significant difference at the 5 per cent level between the four processes of thinking as viewed by the investigators. The thinking processes studied have differential effects as observed from the variation in scores obtained.

As might be expected, the performance of the population as a whole compares favorably with the I.Q. There has been found to exist a positive correlation between perceiving and the I.Q. (+ .66), concept-formation and the I.Q. (+ .63), judging and the I.Q. (+ .55), and reasoning and

the I.Q. (+ .65).

It has been determined that a physical handicap, as a "Gestalt effect," does result in variation of scores achieved by the subjects afflicted as against the scores of the non-physically handicapped. The processes of thinking are affected to a significant degree by a physical handicap. This is inferred from the statistical finding that the two groups, non-physically handicapped and physically handicapped do not have the same distribution.

In terms of the tests administered, there appeared differences in scores between the "normal" handicapped and the "mentally-retarded" handicapped. The same relationships, those of significant differences, exist between the "gifted," "normal," and "mentally-retarded" non-physically handicapped. The scores for the groups varied according to their I.Q. level.

From these results the following inferences were made:

1. That the concomitant variations observed are the thinking processes as defined by the investigators, and that the processes are distinct from one another but they all have an underlying consistency in terms of statistical overlapping of variables.

- 2. That the I.Q. is a measure of global functioning and that the tests used in this study measure molecular effects.
- That these thinking processes appear to be affected by physiological and/or anatomical changes which have been taking place in the organism as in the case of the handicapped.

Microfilm \$2.05; Xerox \$7.40. 156 pages.

THE EFFECT OF AGE, HUNGER, AND FORGETTING UPON INCIDENTAL LEARNING

(L. C. Card No. Mic 58-5994)

Fay-Tyler M. Norton, Ph.D. The Florida State University, 1958

This research was divided into two parts, Experiment I and Experiment II.

The purpose of Experiment I was to compare incidental and intentional learning in two age groups under conditions of hunger and satiation. Each of three variables was varied two ways: incidental and intentional learning, college and fifth-grade age levels, and hungry and satiated conditions. Hypotheses inherent in the three-variable factorial design were tested.

Eight groups of 20 Ss were presented with a series of words half of which were food related. All Ss were required to make a color association for each word, the orienting task designed as a raison d'etre for the experiment for the incidental learners, those not instructed to learn. Three learning measures were made and separately analyzed: (a) total words recalled, (b) food words recalled, (c) a ratio of b to a. Measure c was designed to measure food words recalled with the added control of total learning. The analysis for measure c proved invalid because of the lack of homogeneity of variance. Measures b and c were designed to test the selective role of hunger, or food deprivation, in learning.

Findings indicate that intentional learning is generally superior to incidental learning and that the performance of college students surpasses that of fifth-grade students in both types of learning. However, at the fifth-grade level the difference between incidental and intentional learning is significantly smaller than it is at college level. This result demands experimental clarification as to whether this is a developmental factor or a methodological

artifact.

With the lack of valid analysis of measure c results are not definitive concerning the hypothesis that learning occurs according to a selective principle. They are however, suggestive. Significantly more food words are learned in the hungry state, but total learning (measure a) is also significantly better in the hungry state. These two findings indicate only higher performance or activity level in the hungry state. Yet there was for the food word score, and not for total word score, a significant interaction between age level and motive state, the difference between hungry and satiated conditions being larger for fifth-grade. These data are reinforced by similar results from the pilot study. In view of all the facts, particularly the two interaction terms which are at variance with each other, the hypothesis concerning the selective nature of learning in the

hungry state can neither be accepted nor rejected categorically.

Experiment II was designed to compare the progress of retention following incidental and intentional learning. Procedure was the same as for Experiment I, total number of words recalled being the measure of learning. For twelve groups of eleventh grade subjects (total n=216) retention of a series of words was tested at time intervals of 0, 4, 6, 24 hours, 4 and 9 days. In this portion of the research, the degree of hunger was not a factor.

Forgetting curves for both types of learning show the characteristic rapid drop and gradual tapering off with time. An analysis of variance showed that overall retention following intentional learning was significantly superior to retention following incidental learning. Each intentional learning group scored consistently higher than its corresponding incidental learning group tested after the same time interval. Differences between incidental and intentional learning groups at each time interval are not significantly different from each other, that is, the difference between intentional and incidental learning does not become significantly smaller or larger with time.

Microfilm \$2.00; Xerox \$3.00. 50 pages.

AN EVALUATION OF WHAT IS MEASURED BY THE TAYLOR MANIFEST ANXIETY SCALE BY THE USE OF ELECTROMYOGRAPHY

(L. C. Card No. Mic 58-2762)

Ascanio Michael Rossi, Ph.D. University of Utah, 1958

Chairman: Lyle E. Bourne

The primary purpose of this study was to test the concurrent validity of the Taylor Manifest Anxiety Scale (MAS). The MAS is purported to be a measure of drive. An evaluation of its concurrent validity requires that another, independent, measure of drive be employed to assess the drive level of Ss. A review of the literature demonstrated that muscle action potentials apparently have construct validity as a measure of drive. Therefore, the present study was designed so that the evaluation of the concurrent validity of the MAS would be based on the degree of its relationship with muscle action potentials.

The study was designed so that it would also be possible to evaluate one of the most frequently offered hypotheses to explain the conflicting results which have been obtained in studies employing the MAS. This hypothesis is the one which states that the MAS is a better measure of susceptibility to drive than it is a measure of chronic drive.

Since the MAS is used most frequently in testing a specific hypothesis derived from Hull's theory, the present experiment was designed so that this hypothesis could also be evaluated. This hypothesis is the one which states that high drive will be facilitative on a complex task.

The design of this study included two reaction time tasks: a) a simple task (i.e., the correct response had a high probability of occurring) and, b) a complex task (i.e., the correct response had a low probability of occurring in relation to other responses). It also included two sets

of instructions: a) non-threatening ("react as quickly as you can") and, b) threatening ("react faster than the average girl in your class did or you'll be shocked"). Two groups of male Ss selected from Introductory Psychology classes were used: a) 18 HI MAS Ss (MAS score 20 or above) and, b) 18 LO MAS Ss (MAS scores 8 or below). Nine Ss from each group were administered the Simple-Complex Threat order of tasks. The remaining 9 Ss from each group were administered the Complex - Simple Threat order of tasks. Muscle action potentials were recorded from the right and left forearms during the tasks. Bipolar surface electrodes and an 8-channel Grass EEG were employed for this purpose.

Analyses of variances were carried out on the data, and the results were reported under the following headings: MAS and Reaction Time; Muscle Action Potentials (MAP) and Reaction Time; MAS and MAP; MAS, MAP, and Reaction Time.

The following conclusions were drawn from the results: 1) The MAS has concurrent validity as a measure of drive. However, other characteristics (e.g., task-irrelevant responses) which are also measured by the test may overshadow its usefulness in this regard. 2) The nature of the threat used in studies employing MAS groups deserves more attention than it has received in the past. It appears that physiologically threatening task stimuli leads to superior performance by HI MAS groups in a simple task. Other types of threat, however, may or may not have a differential effect on the performance of different MAS groups. 3) Muscle action potential scores are useful indicants of drive level. However, the relationship of these scores to performance is not a simple one. Other authors have attempted to account for this fact by referring to physiological factors. The results of the present study suggest that personality factors (where personality is considered to be based on learned reaction patterns) must also be taken into consideration.

Microfilm \$2.00; Xerox \$5.00. 96 pages.

EFFECTS OF EXPERIMENTALLY INDUCED STRESS ON CERTAIN MEASURES OF PERCEPTUAL ORGANIZATION

(L. C. Card No. Mic 59-646)

Ammon C. Roth, Jr., Ph.D. Temple University, 1958

This study was designed to investigate the effects of experimentally induced stress on size-distance judgments, fusion-discrimination threshold, and resolution of a perceptual conflict. Three different measures of stress induction were employed: a stylus maze task with accompanying shock; a mirror-drawing pattern with accompanying shock; and an attention test with accompanying distraction.

The stylus maze task required the subject to attempt to learn a very difficult pattern with the knowledge that lack of speed and/or committing of errors would result in a shock through the stylus. The shock pattern was administered at predetermined intervals independent of performance.

The mirror-drawing task required the subject to

negotiate a specially prepared pattern comprised of oblique pathways of varying widths with an automatic pencil so constructed that the lead retracted easily as pencil pressure increased. Directions similar to the stylus maze task were given and shock was administered according to a predetermined pattern. In addition, the experimenter made remarks periodically which implied that the performance was not up to expectations.

In the attention task the subject was requested to mark a series of digits and letters according to six complexly interrelated instructions read to him only once. As he attempted to perform the task, the instructions were played back to him through earphones, but at half-speed.

The dependent variables in this investigation consisted of: (1) the setting of a playing card and an ambiguous stimulus at a target pole under conditions where size was the major cue for distance judgment; (2) a modification of the CFF technique in which a pair of flashes was utilized in place of the continuous on-off ratio stimulation of the conventional apparatus; (3) a task in which the subject attempted to keep a rod parallel to the line of the ceiling while viewing a leaf-lined room through aniseikonic glasses.

Eight groups of college students, 10 males and 10 females per group, making a total of 160, constituted the experimental population. The subjects were volunteers gathered mainly from classes in General Psychology. Four groups were measured on the size-distance apparatus, and the other four were exposed to both the fusion-discrimination task and the perceptual conflict of the leaf-lined room. Each group involved in the two categories of dependent variables was subjected to one of the three stressors or the control period. The major statistical treatment used was the analysis of covariance which permitted an evaluation of the stress effects on the dependent variables between pre-and post-stress trials.

The mirror-drawing and attention test stress groups showed no improvement on size-distance judgments with the playing card after stress, while the control group significantly improved. The maze group did not differ significantly from the control group. No significant change between groups was noted for the ambiguous stimulus.

The three stress groups all showed a decrease in sensitivity in perceiving the fusion-discrimination threshold with respect to the control group; this difference was significant beyond the .01 level of confidence. The three stressors were approximately equal in effectiveness. A significant sex difference was noted in the direction of greater stress effects being found for females than males.

No significant differences were noted between the groups on the leaf-lined room variable. This seemed to suggest that the induced stress was not sufficiently strong to effect this complex perceptual mechanism. Further research is needed to clarify the nature of this perceptual process.

It is hoped that this investigation will contribute useful information to our growing knowledge of stress and perception. Several points which could serve as bases for further research are involved.

Microfilm \$2.00; Xerox \$6.40. 133 pages.

THE INFLUENCE OF AMOUNT AND KIND OF TRAINING ON THE ACQUISITION AND EXTINCTION OF ESCAPE AND AVOIDANCE RESPONSES

(L. C. Card No. Mic 59-620)

John Francis Santos, Jr., Ph.D. Tulane University, 1958

Chairman: Abram Amsel

This research dealt with the relative effects of two training levels and three conditioning procedures on the acquisition and extinction of escape and avoidance responses. The experimental literature indicated that escape and avoidance training would not be equally effective as conditioning procedures during acquisition and extinction but there was no available research that identified the factors responsible for these differences. It was noted there are important differences in the number of reinforcements involved in escape and avoidance situations since the former involves continuous reinforcement and the latter usually involves partial reinforcement. In spite of this, the two procedures have frequently been compared without concern for this important factor.

In attempting to deal with these problems the amount · of training given in each of three conditioning procedures was varied. Different groups were given 100% escape (shock onset when S hit the grid), 100% avoidance (shock onset 1.65 secs. after S hit the grid) or 50% escape and 50% avoidance training in a modified Miller box with distinctive shock and safe compartments for 10 or 40 trials. In this way, level of training was varied and number of reinforcements were controlled more adequately than in previous studies. Forty-eight hooded rats and 42 albino rats were randomly assigned in equal numbers to six experimental conditions with only the restrictions that weight, age, strain and sex be roughly proportionate in all groups. Each S was given all acquisition and extinction trials before the next S was run. A one minute intertrial interval was maintained between all trials. The electrical resistance of each S was estimated after the last extinction trial.

The number of times that S moved from the shock to the safe compartment on acquisition and extinction trials and the latency of these responses were recorded in addition to other behavioral measures. Response frequency (number of non-forced CRs) and response latency (time elapsing between landing on grid and arrival in safe compartment) were plotted separately for each group in five-trial blocks. These data and values derived from them were subjected to non-parametric statistical analyses to determine whether there were significant differences among the experimental groups.

The results and conclusions of this study were the following.

- 1. The experimental variables had more pronounced effects on performance during extinction than during acquisition.
- 2. During acquisition there were differences in response latencies in the Esc, Esc-Av and Av situations with latencies increasing in that order. There were no such differences in response frequency.
- 3. During extinction response frequency increased from the Esc to the Esc-Av to the Av condition and response latency decreased in that order.

4. Differences in performance produced by 10- and 40-training trials were more obvious during extinction than during acquisition. Additional training was followed by relatively great resistance to extinction in the Av groups, less pronounced resistance in the Esc-Av groups and inferior resistance in the Esc groups.

5. A supplementary part of this research, dealing with comparisons between hooded and albino rats, indicated no important strain differences during acquisition but significantly greater resistance to extinction for Hoods in most instances. Comparisons between the electrical resistances of strains and between male and female Hoods revealed significantly lower resistance for males and Hoods.

Microfilm \$2.00; Xerox \$3.60. 61 pages.

AUDITORY ACUITY OF THE MARMOSET MONKEY (HAPALE JACCHUS)

(L. C. Card No. Mic 58-7888)

Herbert R. Seiden, Ph.D. Princeton University, 1958

Using a shock avoidance technique in conjunction with a variation of the method of limits (the "up and down" method), the auditory acuity of five marmoset monkeys (species <u>Hapale Jacchus</u>) was determined. Statistical analysis indicated the data obtained may be presumed to be representative of the species. A sensitivity curve was thus derived for the species.

When compared with man, the sensitivity curve indicates approximately equal sensitivity below 3000 cps and superiority for the monkey above that frequency, except for a tonal dip occurring at about 5000 cps. The region of maximal sensitivity was in the vicinity of 7000 cps and the mean threshold for all animals at this frequency was about 83 db below 1 dyne/cm². (This extended down to 92 db as the mean for one of the animals.) The tonal dip referred to above represents a decrement of some 30 db when compared with the region of maximal sensitivity.

The range of marmoset hearing extends well beyond man's range. The poorest animal in terms of range could hear up to 28,000 cps and the best animal, to 37,000 cps. However, sensitivity falls off sharply after 15,000 cps, rapidly becoming poorer than the sensitivity at the lower end of the auditory frequency spectrum. It was sometimes necessary to stimulate with several db above 1 dyne/cm² to get a response at the higher frequencies.

The consistency of the data obtained in this study with that reported for other phylogenetically different subhuman primates suggests a general hearing function for the sub-human primate which is typified by the marmoset sensitivity curve. This general function includes both the acuity and range of hearing.

In addition to the information concerned with hearing, the results of this study suggest the advantage of a shock avoidance design for threshold determinations with marmosets and the usefullness of the "up and down" method in this type of experiment. In brief, this method consisted of presenting supraliminal tones in descending order until the animal no longer responded (i.e., avoided shock by a jump to the opposite side of a special cage). At this point the series was reversed so that the stimuli were now

ascending. These increments continued until a response occurred at which time the series was again reversed, and so on. Thresholds were defined as the mid-point between the two intensities at which the reversal in response occurred.

The combined effects of the "up and down" method and the shock avoidance procedure were to (1) minimize false responses, (2) minimize failures to respond, and (3) decrease the time needed for threshold determinations. Also, it was possible to obtain both ascending and descending thresholds with these procedures.

Microfilm \$2.00; Xerox \$4.00. 73 pages.

EFFECTS OF ROTATION SPEED AND EXPOSURE TIME ON PERCEPTION OF THE NEGATIVE SPIRAL AFTEREFFECT IN BRAIN DAMAGED AND NON-BRAIN DAMAGED SUBJECTS

(L. C. Card No. Mic 58-3757)

Ronald M. Sindberg, Ph.D. Duke University, 1958

Please see abstract on page 2152.

Microfilm \$2.00; Xerox \$4.60. 90 pages.

A STUDY OF THE EFFECTS OF PRENATAL DOSES OF PHENOBARBITAL ON THE LEARNING BEHAVIOR OF RAT PROGENY

(L. C. Card No. Mic 58-7996)

Myrthalyne Caroline Thompson, Ph.D. Purdue University, 1958

Major Professor: Kenneth M. Michels

The present study was designed to measure the effects that therapeutic dosage levels of phenobarbital, administered to pregnant female rats, would have on the learning ability of the offspring as measured by delayed response problems and pattern discrimination problems. The drug treatment consisted of intraperitoneal injections of 40 mg./Kg. body weight of phenobarbital given prior to parturition. One group of drug-treated female rats received one injection while six doses were administered to another group over a 72-hour period. Sterile saline solution administered intraperitoneally on the same treatment schedule was given to a control group.

The offspring were initially given 240 trials on an indirect delayed response problem utilizing $\frac{1}{2}$, 1, 3, and 4 seconds as delay periods. The second phase of the experiment consisted of six pattern discrimination problems utilizing a four-choice situation in which there was one positive stimulus pattern and three identical negative stimulus patterns. After learning a similar training problem, each animal was given 100 trials on each pattern discrimination problem.

The results indicate that therapeutic dosage levels of phenobarbital given prior to parturition had no definite effect upon the behavior of the offspring in the learning situations utilized in this study.

Microfilm \$2.00; Xerox \$4.00. 75 pages.

AN EXPLORATORY STUDY OF SOME PROCESSES OF THINKING WITH PHYSICALLY HANDICAPPED AND NON-PHYSICALLY HANDICAPPED CHILDREN

(L. C. Card No. Mic 58-5926)

Triantafyllos T. Triantafyllou, Ph.D. New York University, 1958

Chairman: Professor Howard M. Newburger

This exploratory study concerned itself with two major problems. The first was to determine the existence of relationships, if any, between such processes of thinking as perceiving, concept-formation, judging, and reasoning. The second concerned itself with the question of the probable effect of a physical handicap on the processes of thinking.

The investigators were mainly interested in what an individual <u>does</u>. But, what a man <u>is</u>, or is believed to be, was indirectly introduced by the framework within which the experimenters functioned. This framework is known as "holism," which states that there is a tendency in nature to form wholes that are more than the sum of the parts.

The study, as a whole, was directed and bound by its philosophical premises, the theoretical framework within which the investigation proceeded, and the experimental design and methods employed.

The experimental procedure consisted of measuring the four processes of thinking in terms of responses elicited on certain test items. The test items used were the Gottschaldt Figures. The type of response desired by the experimenters was determined by specific instructions given to the subject. These instructions served as "set" and varied according to the process of thinking tested. The two values making up the independent variable were the instructions and the presence or absence of a physical handicap. The response was the dependent variable. The concomitant variations were the thinking processes.

The subjects were selected from the New York City Public Schools. The population consisted of one hundred males ranging in chronological ages from eight through fourteen years. The five experimental groups making up this population were the following:

- Normal (in terms of I.Q.), non-physically handicapped.
- 2. Mentally-retarded (in terms of I.Q.), non-physically handicapped.
- 3. Gifted (in terms of I.Q.), non-physically handicapped.
- 4. Normal (in terms of I.Q.), physically handicapped.
- 5. Mentally-retarded (in terms of I.Q.), physically handicapped.

Results

The results indicate that, in terms of the selected subjects, experimental design, and assumptions made, there is a significant difference at the 5 per cent level between the four processes of thinking as viewed by the investigators. The thinking processes studied have differential effects as observed from the variation in scores obtained.

As might be expected, the performance of the population as a whole compares favorably with the I.Q. There has been found to exist a positive correlation between

perceiving and the I.Q. (+.66), concept-formation and the I.Q. (+.63), judging and the I.Q. (+.55), and reasoning and the I.Q. (+.65).

It has been determined that a physical handicap, as a "Gestalt effect," does result in variation of scores achieved by the subjects afflicted as against the scores of the non-physically handicapped. The processes of thinking are affected to a significant degree by a physical handicap. This is inferred from the statistical finding that the two groups, non-physically handicapped and physically handicapped do not have the same distribution.

In terms of the tests administered, there appeared differences in scores between the "normal" handicapped and the "mentally-retarded" handicapped. The same relationships, those of significant differences, exist between the "gifted," "normal," and "mentally-retarded" non-physically handicapped. The scores for the groups varied according to their I.Q. level.

From these results the following inferences were made:

- 1. That the concomitant variations observed are the thinking processes as defined by the investigators, and that the processes are distinct from one another but they all have an underlying consistency in terms of statistical overlapping of variables.
- 2. That the I.Q. is a measure of global functioning and that the tests used in this study measure molecular effects.
- 3. That these thinking processes appear to be affected by physiological and/or anatomical changes which have been taking place in the organism as in the case of the handicapped.

Microfilm \$2.15; Xerox \$7.60. 162 pages.

PRODUCTION OF LEARNABLE DRIVE IN THE WHITE RAT BY EXPOSURE TO INACCESSIBLE FOOD

(L. C. Card No. Mic 58-7423)

Forrest Leslie Vance, Ph.D. University of Minnesota, 1958

This study was undertaken in order to critically examine the experimental and theoretical literature related to learnable motivation derived from hunger and to test the hypothesis that such motivation can be produced by exposing hungry animals to inaccessible food.

Most of the theoretical literature concerning acquired motivation has focused on aversive drives. Learnable motivation related to appetites or needs has been mentioned chiefly as a side issue in relation to other problems such as secondary reinforcement or latent learning. The present study touches on these contributions and gives an extended account of the work of J. P. Seward, which contains an explicit theory of learnable motivation derived from needs.

Experimental studies in this area have generally produced equivocal results or else have been contradicted on replication. A pilot study for the present research showed that albino rats exposed to inaccessible food in a distinctive stimulus situation would respond to that situation with increased activity during test sessions during which inaccessible food was no longer present. The experimental

portion of this dissertation consisted of an extended analysis of the motivational properties of inaccessible food.

Subjects were forty-eight male albino rats, Wistar strain, about three months of age at the beginning of the study. After a period of taming the animals were exposed to inaccessible food once per day in a twelve inch cubical training cage painted with one and one half inch vertical black and white stripes. Training trials were two minutes long with inaccessible food present under a hardware cloth floor during one minute. For half the animals the inaccessible food was present during the first minute of the trial period and during the second minute for the other half of the animals.

Training trials were conducted at six and at twenty hours of hunger, and tests were run at eight, sixteen, and twenty-four trials under these same deprivation conditions. The conditions of training and testing fall naturally into a twenty-four cell factorial design based on: (a) three levels of training; (b) two levels of motivation during training; (c) two levels of motivation during testing; and (d) two procedures for timing exposure to inaccessible food.

Following training, several tests were run for motivation instigated by the black and white striped box in the absence of inaccessible food. One test involved measurement of general activity during a five minute confinement in the training box. A second test was run in which the animals' tendency to cross a hurdle to escape the striped box was measured. In a third test, the rate of eating of the experimental animals in the striped box was compared with eating rate in a neutral box.

Pre-training data had been obtained on the activity measure and on hurdle crossing. Such data made it possible to evaluate the effect of training on these variables by means of t-tests. Analysis of variance techniques then provided measures of the effects of the various independent variables beyond a minimum level of training.

During tests the animals showed: (a) increased activity in the striped box; (b) evidence of an increasing tendency to escape the striped box; (c) non-significant trends favoring increased rate of eating in the striped box. From these results it seems reasonable to conclude that, under some conditions, exposure to inaccessible food arouses a learnable drive in rats.

Two interpretations of these findings were discussed. One, frustration theory, was criticized as being overly restrictive and as lacking in adequate connections to other areas of learning theory. An alternative, more general theory was proposed, based on the assumption that incentives function directly to instigate drive.

Microfilm \$2.20; Xerox \$7.80. 168 pages.

RELIGION

A COMPARATIVE STUDY OF THE SOCIAL ETHICS OF WALTER RAUSCHENBUSCH AND REINHOLD NIEBUHR

(L. C. Card No. Mic 58-5269)

William Edward David, Ph.D. Vanderbilt University, 1958

Supervisor: Professor Langdon B. Gilkey

It has been my primary purpose in the writing of this dissertation to show that Reinhold Niebuhr has developed his social ethics on the basis of the major premise of Walter Rauschenbusch, namely: the Christian Gospel is relevant to all areas of life, for both man and society stand in need of salvation. While they each affirm this premise, there are both agreements and disagreements between the two men on how the Christian Gospel is relevant to each particular social problem, on the nature of man, and on the nature of personal and social salvation. The secondary purpose of this dissertation has been to discover and set forth, primarily in relation to their social ethics, these agreements and disagreements.

The first chapter points out the relevant historical factors of the period from 1861 to 1957, along with a biographical sketch of each man. Both Rauschenbusch and Niebuhr have been greatly influenced by historical events, the former by American industrial expansion and World War I. the latter also by the Great Depression, World War II, and post-war domestic and international tensions. The optimism expressed by both men before World War I could not long endure the challenge of later events. Rauschenbusch died before the end of the first conflict with having only partially rectified some of his previous views. Niebuhr, on the other hand, has succeeded in correcting his own earlier optimism and such affirmations of Rauschenbusch as the progressive view of history, the optimistic conception of human perfectability, the cultural lag explanation for sin, and the overconfident belief in the degree to which it is possible for society to live by the law of love.

Chapters two, three, and four are a comparative study of the thought of Rauschenbusch and Niebuhr on man, salvation, and social ethics. In the course of this study it has been observed that whereas Niebuhr strives to derive his understanding of creation, history, man, and God from the Bible, Rauschenbusch depends on modern thought for his basic theological ideas. Niebuhr frequently makes use of symbol and myth in interpreting portions of the Bible which are either discounted by Rauschenbusch or interpreted ra-

tionally.

In regard to the sinfulness of man, Rauschenbusch believes that much of man's wrong-doing is due to his sensual equipment, ignorance, and inertia. Niebuhr, on the other hand, affirms that it is possible for man to sin because he is created in the image of God as a free being who is able to transcend himself. Thus man has the ability to raise some limited element of his life such as his race, class, or nation into the position of the divine.

Rauschenbusch and Niebuhr agree on the fact of the social transmission of sin and on the fact that the improvement of social institutions will lessen the practice of some forms of sin. Niebuhr, however, goes on to point out that the heart of sin, i.e., man's unbelief and rebellion against God, which underlie his moral and social failings, will not be lessened by such improvement.

One important difference between Rauschenbusch and Niebuhr is revealed in their attitude toward the problem of transcendence versus immanence, or, simply, the problem of what is possible within history. This divergence is apparent in their discussions of such topics as justification, the Kingdom of God, and the Christian ethics of love. Whereas Rauschenbusch stresses immanence and continuity, Niebuhr stresses transcendence and discontinuity. Rauschenbusch consistently expects more in the way of individual and social salvation within history than does Niebuhr.

Although in their social ethics both men affirm the relevance of the Christian ethic of love to all areas of life, Niebuhr disagrees with Rauschenbusch as to the historical possibility of founding society on love. Even though Niebuhr maintains that the "love" (agape) which is emphasized in the New Testament is the Christian law of life, he does not believe that such love is a simple possibility for either man or society. Rather love is the Christian law of life in the sense in which the love of God revealed in the suffering of Christ is a judgement upon all of man's failures and the standard by which all his partial achievements of good are measured. It is a goal toward which man strives. Though Niebuhr acknowledges that love may have its tentative triumphs even in history, he is convinced that in this world of power-conflicts the best that the Christian can expect to realize is an approximation of justice among competing Microfilm \$4.80; Xerox \$16.00. 373 pages.

STUDIES IN TALMUDIC LAW OF DIVORCE

(L. C. Card No. Mic 58-3026)

Meyer S. Feldblum, Ph.D. Yeshiva University, 1958

DEFINITION OF SCOPE: This project is primarily a critical study of Tractate: "Gittin," as to the history of Talmudic Jurisprudence, and the structure of the Mishnah, Tosephta, Babylonian and Palestinian Talmuds.

METHODS OF PROCEDURE AND SOURCES OF DATA: All available critical editions and manuscripts, with their commentaries until the sixteenth century were utilized for comparative study and analysis.

SUMMARY OF FINDINGS: The Mishnah is an authoritative collection of laws, serving as a guide for instruction and study. It consists of several layers, the later ones

elaborating and explaining the earlier ones. The editors' views are indicated through selection and arrangement of material. They even formulated much of the Mishnah.

The development of the Talmud's Sugyoth was traced to ascertain the development of Talmudic Jurisprudence. Greatly stressed were the study of parallel material in each Talmud, as well as the comparative study of the Babylonian and Palestinian Talmuds.

CONCLUSIONS AND RECOMMENDATIONS: Critical texts must be established in Talmudic literature, and then, each text's structure and development must be studied. Only through such studies, can the history of Talmudic Jurisprudence be placed in its proper perspective.

Microfilm \$3.45; Xerox \$11.80. 268 pages.

SOCIAL PSYCHOLOGY

PAROLEE CONFORMITY TO SOCIAL STANDARDS: OVERT ACCEPTANCE OF THE REGULATIONS OF THE PAROLE BOARD BY PAROLEES FROM A MAXIMUM SECURITY PRISON AS MEASURED BY THE KAHN TEST OF SYMBOL ARRANGEMENT

(L. C. Card No. Mic 58-7617)

Arnold Victor Goulding, Ph.D. New York University, 1958

Chairman: Associate Professor Howard Newburger

The purpose of this study was to identify and predict individual reaction to and overt conformity with accepted social standards by parolees from a New Jersey maximum security prison.

The relationship between manipulation and verbalization with respect to symbolic objects and the overt adjustment to accepted social standards of society in the Western culture was compared, the former being measured by a projective technic, the Kahn Test of Symbol Arrangement, and the latter being measured by the Rules and Regulations governing the administration of Parole in New Jersey. A comparison was made with an earlier study.

The Kahn Test of Symbol Arrangement was given sixty serially selected inmates just prior to their release on parole in 1956. They were initial applicants for parole from Trenton State Prison who were first or second felony offenders and the culture constant was held steady since they were native-born, Caucasian or Negro only. Six months after their release, a questionnaire was filled out by supervising parole officers.

Twenty subjects, picked by random sampling, were compared on the null hypothesis with the other forty subjects and statistical treatment upheld the null hypothesis.

Chi-Square treatment gave significance at the 0.51 Level for the group of forty subjects and at the 0.22 Level for the group of twenty subjects. Although neither were significant at the 0.05 Level, a definite trend appears to be present.

Biserial coefficient of correlation was .2709 with P=.28 (approximately) or 72% for the group of forty subjects. This showed that a tendency was present, although not a strong one. Statistically, a positive trend was present, but slight.

The comparison of the present experimental group with a 1935 group from the same prison showed a varied picture. Both groups showed a significant difference between Caucasian and Negro races with respect to Violations of Parole, with the former having a smaller number, statistically and significantly.

Statistical comparison of the two studies was otherwise not feasible because of factors such as different populations, lack of raw data, significantly different definitions of basic material and highly significant changes in the industrialization of the environment which had taken place during the interim period from 1935 to 1956.

The conclusion is that a relationship has been established between individual behavior of parolees from a New Jersey state prison and the overt adjustment to accepted standards of society as manifested by legally instituted Rules of Parole. The relationship is positive and although not found to be statistically significant at the usual levels of confidence, does show a statistical trend.

The method of determining the parolability of an inmate of state prison, discussed in this study, is a dynamic evaluation of the personality of the individual as he exists at the time he is awaiting return to free society. It includes the forces and vectors which have impinged on him throughout his life and therefore treatment based upon a test battery, of which this is a part, should prove more effective and productive.

Suggestions were made concerning possible areas in which further experimentation might be carried out using the basic design of the present study with suitable modifications.

Microfilm \$2.00; Xerox \$4.40. 84 pages.

CHANGES IN CONCEPT OF SELF AND OTHERS AS A FUNCTION OF INCARCERATION IN A CORRECTIONAL INSTITUTION

(L. C. Card No. Mic 59-33)

Robert DeNeille Kerns, Ph.D. University of Pittsburgh, 1958

Authorities disagree as to the effectiveness of treatment in a prison setting, but there appears general agreement that men do change in some way while confined. Sutherland's Differential Association Theory, which points to the consequences of the learning experience, both in the institution and in the community, in the development of a criminal self-identification, provides a theoretical framework in which to investigate the effects of incarceration. A measure of self concept seems a suitable instrument for

measuring changes which occur in prisoners. Harris instructed 81 prisoners to compare themselves with the average person not incarcerated on 49 trait-words modified from the Index of Adjustment and Values developed by Bills, Vance, and McLean, obtaining a measure of perceived disparity between the self and the average person. He found less perceived difference with longer incarceration, but it seemed possible that these results may have been due, in part, to changes in the concept of the average person as well as to change in self concept. The present research was designed to investigate the stability of the concept of the average person and to replicate the Harris study in accordance with a hypothesis which seemed more consistent with the implications of Sutherland's theory, namely that the expected change would be in the direction of greater uniformity.

The measure used by Harris was also used in the present study. Subjects were instructed to rate themselves, the average person not incarcerated, and the average convict, according to how much of the time the trait-word was descriptive of themselves or the group being rated. Subjects were 110 penitentiary inmates, all incarcerated for the first time. An individual's score on each rating was the sum of deviation points from the group mean, and three additional scores were computed by summing differences between pairs of ratings. Number of months incarcerated was the major independent variable. Additional data were collected on Race, Age, Type of Crime, Age at First Arrest, Age at Incarceration, and Number of Arrests.

A comparison of variances on the six score variables revealed significant differences between those with most and those with least incarceration on the convict rating and on perceived difference between the self and the average convict. The difference was contrary to that expected from the theory, however, greater dispersion being found in the longer incarcerated group, and the hypothesis was not substantiated. A correlation of .24 was found between "Months Incarcerated" and perceived difference between the average person and the average convict, while none of the other correlations between "Months Incarcerated" and score variables were significant. Four of the control variables, Race, Type of Crime, Age at First Arrest, and Number of Arrests were also found significantly related to several of the rating score variables. Item analysis revealed 20 trait-words which, in varying combinations on the six score variables, discriminated between groups with most and least incarceration.

There was no apparent tendency for change in concept of the average person to occur during incarceration, but neither did the other two ratings change, and the evidence remains inconclusive. It seems, however, that "the average person" may safely be used as a standard of comparison in self concept studies.

The findings are generally inconsistent with the implications of the Differential Association Theory in that there was no evidence of increasing identification with the criminal group. Since all subjects were incarcerated for the first time, it may be that the primary factor in the development of a criminal concept of self may be the rejection by society experienced by the prisoner upon release, and the consequent turning for acceptance to the criminal group. Although the hypothesis was not substantiated, the data suggested several areas for further research, including the development of a more efficient measure, investigation of the influences leading to an increased dispersion in certain

attitudes during incarceration, and investigation of an apparent basic difference between men incarcerated for different offenses, for which a self concept measure seems a relatively sensitive instrument.

Microfilm \$2.00; Xerox \$3.00. 56 pages.

SOME INFLUENCES OF VERBAL REINFORCEMENT UPON REFERENCE SCALE FORMATION AND DISCRIMINATION

(L. C. Card No. Mic 58-7877)

Mervyn William Perrine, Ph.D. Princeton University, 1958

The reference scale is related to the constructs of attitude, concept, and frame of reference, and it has been defined as the background of functionally related stimuli against which a single stimulus is judged. A reference scale is learned and is usually inferred from responses.

The present study was concerned with the influence of indiscriminate verbal reinforcement upon (a) reference scale formation and change, and (b) the accuracy of discriminating a relevant, novel stimulus introduced into an established reference scale. The study was designed to determine the nature of the reference scales formed under the experimental conditions and to test the hypotheses (a) that negative reinforcement facilitates and positive reinforcement inhibits the discrimination of the novel stimulus, and (b) that negative reinforcement inhibits and positive reinforcement facilitates the formation of stable reference scales.

The independent variables were the novel stimulus and the type of verbal reinforcement, praise or criticism. The dependent variable was the estimate of linear extent. The task consisted of estimating in inches the distance between two pinpoints of light (0.5 second duration) presented in an unfamiliar and totally dark room. The 44 subjects were run individually and assigned randomly to one of the four conditions: Praise (P), Criticism (C), Verbal Control (VC), and Stimulus Control (SC).

"You are doing well" and "You are doing poorly" were the prototypes of the reinforcement received--regardless of actual performance--by P and C, respectively. VC and SC received no reinforcement. The four stimulus-distances were 5", 9", 11", and 15". Only three of the four distances were presented initially to P, C, and VC. After 20 trials, the novel stimulus-distance (11") was introduced into the sequence and continued until the completion of the session (60 trials). Following each block of six trials was a brief rest period, during which the subjects in P and C were reinforced. All the conditions in SC were the same as in VC, except that all four stimulus-distances were presented from the beginning.

The principal results were that the general order of groups (a) was P, VC, C, and SC in terms of increasing accuracy of discriminating the novel stimulus; (b) was P, SC, VC, and C in terms of increasing response variability; and (c) was P. VC, SC, and C in terms of increasing magnitude of median estimates. It was also found that the more stable the standards, the more the introduction of the novel stimulus effected response change, but the less it affected scale 'shape.' The influence of reinforcement upon the

'shape' of the reference scale was greater than the influence of either practice or the novel stimulus.

On the basis of these results obtained in an unstructured situation, it was concluded (a) that indiscriminate negative reinforcement facilitates discrimination of a novel stimulus, inhibits formation of stable reference scales, and causes an upward shift in the whole scale; and (b) that indiscriminate positive reinforcement inhibits discrimination of a novel stimulus, facilitates formation of stable scales, and causes a downward shift in the whole scale.

The implications of this study for flexibility, confidence, and discrimination in reference scale formation were discussed. The influence of interpersonal conditions upon the variability of difference thresholds was also discussed.

Microfilm \$2.00; Xerox \$7.00. 149 pages.

A STUDY OF OPINIONS REGARDING MENTAL ILLNESSES AND FACILITIES FOR THEIR CARE AS RELATED TO SOCIAL CLASS MEMBERSHIP

(L. C. Card No. Mic 58-5997)

Charles Ashley Stewart, Ph.D. The Florida State University, 1958

The basic intent of this study was to search for possible relationships between opinions regarding certain aspects of mental illhealth and positions in the social class hierarchy. This study was a part of a larger project which investigated opinions regarding mental health, physical health, child-rearing, leisure time, family-planning, welfare services, and women working outside the home.

A small agricultural service town (population circa 6,000) in south Georgia was the scene of the study. A random sample of 247 white housewives was interviewed with a schedule designed to elicit responses regarding mental illness and mental health services. The schedule also included items used to assign respondents to positions in the social class hierarchy of the community. The instrument used to assess social class membership was the McGuire-White Index of Social Status--Short Form.

The null hypothesis--that opinions regarding mental illness and mental health services are independent of social class membership -- was divided into five subhypotheses related to (1) causes of mental illness, (2) symptoms of mental illness, (3) mental health services and personnel, (4) the stigma of mental illness, and (5) the released mental patient. Chi-square was the statistical model used to determine dependence of the variables.

The null hypothesis could not be rejected on the basis of the findings since dependence (.05 level of confidence) was found in only 10 of the 36 items used. For only two of the five null subhypotheses, however, was a categorical acceptance possible. The patterns of responses suggested that the relation of social class membership and opinions regarding mental health needs further investigation.

The sample population in toto was revealed as somewhat innocent of contemporary ideas regarding mental illness. The need for education of the community by appropriate state and community agencies was indicated.

Microfilm \$2.00; Xerox \$4.00. 74 pages.

SURVEILLANCE AND TRUST

(L. C. Card No. Mic 58-5969)

Lloyd Herbert Strickland, Ph.D. The University of North Carolina, 1958

Supervisor: John W. Thibaut

An experiment was conducted to investigate an aspect of the role of surveillance in the development of interpersonal trust. It was an attempt to ascertain whether or not the differential surveillance which a superordinate subject had over two subordinates would result in his holding differential trust in them and in a desire to maintain this differential surveillance. It was sought to demonstrate that this differential trust and surveillance would be a function of S's perceiving a differential causal locus for the subordinates' compliance with his productivity demands.

The experimental situation was one in which the subject "supervisor" demanded from two "workers" (actually fictitious) a high output on an apparently dull task. He had the power to check up on (monitor) and possibly punish these workers for not meeting his output demands, but he had this power to a far greater extent over worker A than worker B during an initial series of 10 work periods. After this series of work periods the supervisor could see that the output of both workers (a) always met or exceeded his output standard (Group I) or (b) failed to meet the output standard on only one non-monitored work period (Group II) and (c) was ultimately equal.

At this point an attempt was made via questionnaire methods to assess (1) the relative "trust" which the subject held in his two subordinates and (2) the subject's perception of the causal locus for their compliant behavior. A second series of work periods followed, during which the subject could monitor his two subordinates after any period he wished, although not simultaneously, in an effort to maintain their satisfactory productivity.

The following major findings evolved:

- I. There was a statistically significant tendency for the subject to monitor Subordinate A more than Subordinate B during the second series of work periods.
- II. If subjects made a discrimination between their subordinates in trust, there was a statistically significant tendency for them to trust B more than A.
- III. There was a strongly indicative, although not statistically conclusive, tendency for differential monitoring and differential trust to be a function of the subject's perception of different causal loci for his subordinates' compliance. Subjects who monitored A more than B or trusted B more than A tended to perceive A's compliance as due to forces outside A, most often in their own application of power. Conversely, they tended to perceive the causal locus for B's compliance as inside B; that is, they saw B's compliance as stemming from some personal desire to do well.

Four additional findings were obtained:

1. there was a statistically significant tendency for the subject to see the low surveillance subordinate

(B) as more dependable than the surveillance subordinate (A);

- 2. before the initial experience of differential surveillance, a significant majority of subjects had expected Subordinate A to be more productive than Subordinate B;
- the optional differential surveillance which occurred during the second series of work periods was a function of differential confidence which the subject held in his subordinates, although the relationship was not conclusive;

4. there was a significant tendency for the supervisorsubjects to state that, had they been forced to select a subordinate for higher surveillance during the optional monitoring series of work periods, they would have chosen Subordinate A.

These findings were discussed in the light of related research on trust and cooperation and their implications for problems of efficient supervisory activity were considered. Finally, attention was given to ways in which the interaction situation may determine the concomitant type(s) of causality attribution.

Microfilm \$2.00; Xerox \$4.40. 83 pages.

SOCIOLOGY

SOCIOLOGY, GENERAL

CHARACTERISTICS OF OLDER JOB-SEEKERS: AN ANALYSIS IN TERMS OF THEIR UNEMPLOYMENT HISTORIES

(L. C. Card No. Mic 58-7390)

Frank Joseph Atelsek, Ph.D. University of Minnesota, 1958

The Problem

Two major questions were asked in this study: 1) Are certain personal and social characteristics of older job-seekers associated with their relative success or failure in maintaining themselves in the labor force? 2) If so, can a means be devised by which these distinguishing characteristics will classify older job-seekers according to their chances for re-employment?

The data for this study were collected in conjunction with a comprehensive research program on unemployed older workers sponsored by the Department of Labor. 1

The Sample

The sample includes 786 unemployed men aged 45 and over who visited the Minneapolis and St. Paul offices of the Minnesota State Employment Service during January, February and March of 1956.

The Dependent Variable

This is defined in terms of duration of unemployment during the period 1953-55. Workers who experienced five or fewer months of unemployment over this 3-year span (SD job-seekers) were compared with those having been unemployed six or more months (LD job-seekers).

The Method

A matching procedure whereby all job-seekers were paired by age and occupation served as a control on these and related factors. The matching yielded 251 pairs on whose responses the analysis was based. The remaining 284 unmatched individuals were used to validate the classificatory efficiency of the scale of significant characteristics derived from the matched group.

The Independent Variables

The independent variables included factors from the following areas:

- 1) Integration into the community
- 2) Family characteristics
- 3) Patterns of labor force participation
- 4) Economic characteristics
- 5) Personal factors affecting job opportunities

The Availability Scale

In addition to the five categories of factors designated above, a six-item Guttman-type scale was constructed. This scale assessed the job-seekers' attitude about suitable work and served as a measure of personal restrictions on availability for work.

The Findings:

The Characteristics Scale (C-Scale)

Among the matched pairs of job-seekers, twenty characteristics were significantly associated with successful participation in the labor force as measured by history of unemployment. These were weighted according to their predictive efficiency. The C-scale derived from this procedure was then applied to the characteristics of the 284 unmatched job-seekers to determine how many of them could be correctly classified as short duration (SD) or long duration (LD) unemployed workers.

About two-thirds of them were correctly categorized by means of this Characteristics Scale when the zero score was used as a cutting point to divide the short-duration from the long-duration unemployed.

Concerning a possible practical application of such a scale, attention was given to how it might be modified to enhance its usefulness in selecting from among older jobseekers those who could most profit from special job counseling. To illustrate this the sample was broken down into various age-occupation-availability subgroups and the thirty-third percentile score of each subgroup was used as a Characteristics Scale cutting score for each subgroup. Using this modified criterion, about 80 per cent of the

long-duration and about 45 per cent of the short-duration unemployed were correctly classified.

Microfilm \$3.05; Xerox \$10.40. 234 pages.

1. U.S. Department of Labor, Bureau of Employment Security, Older Worker Adjustment to Labor Market Practices, Bes No. R.151, (Washington: Government Printing Office, September 1956)

THE "VO-AG" TEACHER: AN INQUIRY INTO THE STATUS AND ROLE OF AN EMERGENT PROFESSION

(L. C. Card No. Mic 58-5932)

Frank Alan Burtner, Ph.D. The University of North Carolina, 1958

Supervisor: Rupert B. Vance

This study has to do with the rise of a new profession in the public service; it treats of the role and status of the teacher of vocational agriculture as they have developed within the fields of scientific and public education. Interest was centered on the system of norms and expectations included in this role.

Inquiry proceeded through setting up an "ideal type" of teacher of vocational agriculture by means of a panel interview conducted with five teachers of vocational agriculture, using a prepared schedule. The schedule was prepared so as to reveal progression in a career and questions were grouped into seven categories: (1) vital statistics, (2) career decisions, (3) first experiences, (4) job mobility, (5) establishment and present situation, (6) tensions involved in role, and (7) changing nature of work and retirement.

Analysis revealed that the teacher of vocational agriculture is a member of two bureaucracies—that of the state and that of the public schools, and his position is not integrated fully into either. The resulting status dilemma is pointed up in the following particulars: as a teacher, he is a male in a field dominated by females; as a technical adviser, he is a general practioner in a field dominated by specialists; as a community leader, his position is neutral and he is followed only by children and the less successful farmers; as a permanent member of a community, he tends to live between rather than within a single unified territorial group, and his participation in organized community groups progressively decreases; as a professional man, his techniques are generalized and the tradition which he represents appears to be waning.

The future of the "Vo-Ag" teacher is circumscribed by decreasing numbers in agriculture. A possible alternative role is that of vocational guidance, but this would involve a change in legislation which would make him even less of a specialist in agriculture than he is at the present.

Microfilm \$2.65; Xerox \$9.20. 202 pages.

INSTITUTION IN PROCESS: A CASE STUDY IN THE DYNAMICS OF RURAL HEALTH ORGANIZATION

(L. C. Card No. Mic 58-7395)

Courtney Blair Cleland, Ph.D. University of Minnesota, 1958

Adviser: Lowry Nelson

The problem was to account for the failure of the Community Clinic at Williston, North Dakota, which was a consumer-sponsored attempt during the 1940's to improve medical service in a Northern Plains area. It was hypothesized that a voluntary, local institution which is dependent upon two or more groups in the community for its enactment, can become established only to the extent that these groups develop a shared frame of reference.

The effort to establish the Clinic was treated as an "institution in process." The event-by-event story of its origins, development, and decline was reconstructed. A period of six months of resident-observation provided general knowledge of the community. Specific information was gathered by means of interviews and by study of documents such as letters, minutes of meetings, and reports.

As an aid in lending substance to the general hypothesis, the researcher developed a conceptual model which delineated the early stages of an institution-in-process. These included: (1) a "felt need" in a sympathetic social climate, (2) gestation of the original idea leading to growth of effective reference groups, which become incipient institutional groups, (3) legitimation, decision, and formal organization, (4) acquisition of resources including membership, (5) revision of ends and means as needed, (6) bureaucratization, (7) accommodation to conflict, and, finally, (8) either a successful performance stage or a stage of disorganization which leads to expiration of the institution or hiatus pending reorganization.

It was found that such success as the Community Clinic had could be linked to a Farmers Union cooperative movement which had flourished in the area. However, coupled with the conflicting ideologies of doctors and non-farm groups, it also explained why the Clinic organizers failed to develop a "community" frame of reference, enlisting town as well as country.

On the one hand, the medical society tended to perceive any lay-initiated plan for medical service as a threat. On the other hand, the previous experience with the "segmental" types of cooperatives failed to prepare the Clinic leaders for a task as delicate as securing legitimation from the local doctors.

Basically, it was a failure of competing groups to reconcile differences to the point where they could develop a shared frame of reference which would support a new institution to their mutual benefit and the benefit of the community.

The concept of stages in the institutional process could be only tentatively verified by a single case study. More rigorous testing of these stages is dependent upon further research. Microfilm \$4.70; Xerox \$15.80. 368 pages.

THE SOCIAL ECOLOGY OF TREATED FUNCTIONAL PSYCHIATRIC DISORDERS IN EASTERN NORTH CAROLINA

(L. C. Card No. Mic 58-5957)

Ann Carol Maney, Ph.D. The University of North Carolina, 1958

Supervisor: Dr. Harvey L. Smith

In the past, "ecological" studies of mental illness have been of two kinds: those concerned with social characteristics of a community or population group in relation to the development of illness; and those concerned with the distribution of individual social attributes of the mentally ill. Although the ecological correlations in the first type of study can be used to indicate the social context within which the mentally ill hold certain statuses and against which their status affiliations may be evaluated, as well as to point up the major cultural stressors which prevail, a tendency has developed to use them as substitutes for knowledge of the individual attributes of those who become ill. In this study, an attempt is made to combine these approaches by looking at the individual status affiliations of a group of mental patients in relation to the community settings from which they come.

The subjects are those patients with functional psychiatric disorders admitted for the first time to the State Hospital at Raleigh, North Carolina between 1949 and 1951. The community settings treated are in the 43 county hospital service area, which comprises the eastern, agricultural section of the state. Since urbanization, in the form of urban rather than metropolitan influence, is apparently a most important process of social change (and thus source of potential stressors to the individual) in these communities, the ecological principles of gradience and differentiation were incorporated into a gross model of levels of urbanization, based on tier-distance from trade centers of 10,000 or more inhabitants.

It was found that communities in the tier adjacent to trade centers had the highest overall rate of state hospitalization, while the tier containing trade centers and the tier farthest removed from trade centers had overall rates about half as large. This general pattern was maintained, and its statistical significance increased, when considered in relation to patterns by sex, occupation, age, and education status categories. When residence type was treated, however, it was found that the rural farm inhabitants of the tier farthest removed from the trade center had the highest rate, and that in general, the relationship between the tiers and state hospitalization for functional psychiatric disorders differed within various categories of residence type. It is suspected that these differentials arise from variations in rate of urban change within the tiers. These and other findings were used to pose questions for further research. Microfilm \$2.20; Xerox \$7.60. 165 pages.

MIDDLEVILLE MORTICIANS: SOME SOCIAL IMPLICATIONS OF CHANGE IN THE FUNERAL BUSINESS IN A SOUTHERN CITY

(L. C. Card No. Mic 58-7341)

William Henry Porter, Jr., Ph.D. Louisiana State University, 1958

Supervisor: Professor Vernon J. Parenton

Historically, the funeral business has been a culturally marginal institution that has sought social recognition and full institutionalization. This attempt, blocked in part by liberal theological elements, has nevertheless been aided by increasing secularization of the church and its consonance with middle class values in a materialistic culture.

In a functional-utilitarian sense the funeral director is seen as a needed actor on the social scene. The funeral business, established around a technological development, arterial embalming, with its allied arts, dermasurgery and cosmetology, is seen as utilizing this technology in terms of possession-control of the body as a latent, but nonetheless vital factor in the establishment of the institution in the culture. Middleville's morticians are followed through three phases in historical development, from a condition of complacent monopoly, exercised by a traditionally conservative family-operated establishment, through a period of revolutionary change initiated by a funeral director advocate employing relatively new and radical mechanisms in the implementation of dynamic concepts of service. A third phase has been indicated as an era of stabilization characterized by the emergence of a "new monopoly."

Against the backdrop of economic depression and monopolistic mortuary practices the advocate's appeal to low-cost, personal service oriented funerals constituted the basis for changes that were fixed in the social structure by the catalytic effects of industrial insurance. Employed originally as a defense measure against outside burial association encroachment on the Middleville domain, this form of security assumed positive proportions in a competitive context. Spread geographically by the establishment of branch funeral homes and insurance offices using the free ambulance service provision as a promotional device, this new force provided the entering wedge and operational context for the innovator.

From the crucible of competitive struggle, which witnessed the near collapse of an old line traditional firm and the emergence of three others, has arisen a relatively stable condition adequately described as an "insurance monopoly." This condition is seen as serving as an effective deterrent to new competition. With comfortable monopolies in a rapidly expanding urban area, Middleville's morticians seem in a large measure future oriented. Significant proportions of their clientele are, through industrial insurance, committed to the utilization of their services, providing a measure of security that has resulted in reciprocal agreements and a resultant diminution of competition. Future competition, it is believed, is likely to have its locus in the area of industrial insurance, with deliberate emphasis upon the cultivation of the professional and upper-middle classes. A career-type insurance agent is seen as a necessary prerequisite to such a program, with a possible realignment of the policy structure to adjust the level of benefits for the more privileged Microfilm \$3.00; Xerox \$10.20. 230 pages. groups.

THE PREDICTION OF HOUSEHOLD MOBILITY FROM AN URBAN SUBDIVISION

(L. C. Card No. Mic 58-7990)

Arthur Herbert Richardson, Ph.D. Purdue University, 1958

Major Professor: Gerald R. Leslie

One of the major characteristics of contemporary America is the large-scale mobility pattern among families. Approximately one in five families shifts its place of residence each year. Sociological literature contains many studies of mobility, but almost all such studies have focused upon the migration rates of areas or of groups and little, if at all, upon the mobility of individual households. The purposes of this study were to attempt the prediction of individual household mobility and to seek causal explanations for such mobility in Vinton Homes, a mass-produced residential subdivision of Lafayette, Indiana.

A fifty percent random sample of 201 households was selected for the purposes of this study. About one week before an interview was to take place letters of introduction were mailed to all households in the sample. When actual interviews took place all informants consented to being interviewed with only five refusing to respond to certain attitude items. The data for each household were coded and punched on IBM cards, and marginals and cross tabulations were run. IBM facilities were used in the computation of point correlations and a multiple correlation regression design was taped and run through a datatron computer.

The Vinton Homes residents were found rather homogeneous in their social characteristics. They had all moved into the area within a fairly short time period. They were for the most part young, had fairly conventional family arrangements, had young children, were purchasing their home, and had neither very high nor very low economic status.

The prediction of household mobility was made from eight items which were inter-correlated and then correlated with stated mobility intentions for a one year period. The eight items used were age of head of household, household size, owning or renting status, attitude toward house lived in, attitude toward Vinton Homes subdivision, number of years of education of household head, perceived class differences between self and neighbors, and social mobility expectations. Four items were found to be definitely related to stated mobility intentions. The four items were social mobility expectations, perceived class differences, number of years of education, and house attitude. From these four items a predictive equation was formulated. In only nineteen cases did this predictive equation fail to predict a household's stated mobility intentions.

One explanation for household mobility was sought in life cycle theory. This did not prove to be fruitful. Experimentation was made with a typology of households according to occupational mobility potential, education, and age. The most important single variable accounting for stated mobility intentions among Vinton Homes residents was found to be occupational mobility potential. Education and social mobility expectations were also important. Education can be viewed as a means to occupational mobility potential and social mobility expectations can be viewed as largely a function of occupational mobility potential.

Microfilm \$2.00; Xerox \$5.80. 119 pages.

PERSONAL ADJUSTMENT TO PERCEIVED AND MEDICALLY ESTABLISHED HEART DISEASE

(L. C. Card No. Mic 58-7991)

Donald C. Riedel, Jr., Ph.D. Purdue University, 1958

Major Professor: Robert L. Eichhorn

The primary purpose of this thesis was to examine the interrelationship of an individual's medically determined health status and his perceived health status as they affect work behavior and health behavior (compliance with therapeutic advice, use of physicians, and treatment of reported symptoms).

The data used for the analysis was drawn from personal interviews and complete physical examinations of 397 Indiana farmers. The sample was designed to include a large number of the cardiac impaired for analytical purposes, chosen on the basis of response to a mail questionnaire sent out to all farmers in five Indiana counties.

Clinical examinations of the respondents determined that over half of our respondents were free of any cardio-vascular related disorder at the time of the survey; one-eighth had abnormalities of the circulatory system; and one-third actually had or were suspected of having one or more types of cardiovascular disease.

In general the more severe types of disease were found to have been previously diagnosed by a physician, while borderline cases were previously undiagnosed and unsuspected by the respondent.

Four basic types of respondents emerged by combining perceived health status and medically established condition: "True Cardiacs," "Iatrogenics," "Unknown Cardiacs," and "Normals." These groups varied with respect to symptoms experienced upon physical exertion, information about health maintenance, causes, cures, and types of heart disease. The doctor, family, and friends of the respondent proved to be influential in conditioning his ideas about these aspects of health.

We found little difference in the groups' use of physician, but the entire sample manifested a great deal of concern with health matters. In regard to treatment of reported symptoms and preventive health measures taken, the difference among the groups was much greater.

Cardiacs, as a group, were given more therapeutic advice for their disorders than were introgenics. Prescriptions in work behavior accounted for most of the advice given.

Most of those respondents who failed to comply with their physician's advice reported that their "habitual ways of doing things" accounted for their deviant behavior. A higher proportion of non-compliers had a negative predisposition toward quitting work than did compliers. We also found that certain "anti-medical" beliefs were partly responsible for non-compliance.

There was very little self-restriction in performing various activities evident among those respondents who considered themselves normal. We found the more stringent restrictions most frequent among those who had a "severe" disease.

Therapeutic advice by a physician, combined with experiencing symptoms associated with cardiovascular disorders, appeared to explain the behavior of those respondents who persisted in activities considered strenuous by the physician. Those who did not experience any particular

discomfort upon exertion were more likely to disregard their physicians' advice.

We also found that as compulsiveness toward work increased, compliance with therapeutic advice given by the physician decreased. Further more, those individuals who either complied exactly or did more than the physician ordered had more family and community aid in getting the farm work done when they were sick than did those respondents who did nothing the physician ordered.

Microfilm \$2.70; Xerox \$9.40. 206 pages.

SOCIOLOGY, FAMILY

AN EMPIRICAL STUDY OF PARENT-CHILD RELATIONS: MATRICENTRISM IN THE SOUTHERN FAMILY

(L. C. Card No. Mic 58-3028)

John Titus Blue, Jr., Ph.D. The American University, 1958

This research was a study of the Southern family directed toward finding out which parent, mother or father, was most closely related to the child.

Theoretically, the parent-child relationship was regarded as a set of status-roles, and the status-roles were considered to be culturally determined. The nature and functioning of these status-roles were shown to be such that the role of parent or of child is integrally related to the other roles the person fills. Thus, all roles are interrelated and often, have other status-roles as eligibility prerequisites.

Status-roles were treated as the means by which persons are reciprocally related and by which their interaction is patterned. The content of status-roles-- (1) activity, (2) emotions and sentiments, (3) duties and obligations, (4) rights and privileges, and (5) power and authority--are treated as being culturally determined.

The vital ties between persons in the status-roles are relational bonds which make the relationship meaningful, give ego-satisfaction, and operate so that functional ends of the status-roles are achieved. Indoctrination and social control are operative in building these ties between persons. The relational bonds are viewed as meeting egoneeds, but stress is placed on the fact that the parent-child relationship functions in the socialization of the child. Pilot studies and probative interviews with parents and children revealed the general types of bonds to be (1) personal, (2) functional, and (3) those of antagonisms and anxieties and the particular content of each was delineated.

The effect of social and situational factors on parentchild relations was explored, and sex, race, and social status were selected as factors to be held constant in this research.

The working hypothesis was that, except for antagonisms and anxieties, the bonds between child and parent were matricentric. This particularly would apply to girls; boys were expected to be patricentric on the functional bonds and on all personal bonds except those involving affection and rapport. Both sexes were expected to be patri-

centric in the cases of antagonisms and anxieties. Negro children were expected to be more matricentric than white and lower social status groups to be more matricentric than the higher groups. The rationale for these hypotheses was formulated in terms of parental differences stemming from the division of labor and the aura effect of their other roles. Consideration was given the child's needs as social maturation took place.

The data were gathered from high schools by using a lengthy questionnaire. The whole sample numbered 607 white and negro adolescents with native-born parents. Their responses to questions about which parent was related to them in 84 different ways were statistically evaluated to determine when the children were patricentric, matricentric or ambicentric. This was done for the whole sample, sex groups, sex-race groups, and sex-race-social status groups.

Personal bonds were found to be highly matricentric; functional bonds were a little less so. Antagonisms and anxieties were patricentric. Boys were more matricentric than girls on affectual bonds. On the functional bonds, girls were extremely matricentric, boys were less matricentric and were even patricentric in some respects. On antagonisms and anxieties, boys were more patricentric than girls. Negro children were more matricentric than white, as a rule, on the personal and functional bonds. The lower social status groups of both races generally were more matricentric than the upper social status groups. The expectation of sex linkage for boys to father proved related to race and social status and was very much less than expected.

The work closes with a discussion of the limitations of the study and of the significance of the findings and the theory. Suggestions about further research are presented. Microfilm \$5.50; Xerox \$19.40. 429 pages.

THE FUNCTION OF A SOCIAL AGENCY
HOMEMAKER, HER ATTITUDES AND RELATIONSHIP
TO A CLIENT FAMILY: A STUDY OF SOCIAL
AGENCY HOMEMAKERS, THEIR ATTITUDES AND
RELATIONSHIP TO THE FAMILIES THEY SERVE,
AND HOW THESE RELATIONSHIPS AFFECT
THE QUALITY OF THE SERVICE

(L. C. Card No. Mic 58-5652)

Ruth Lewis Farkas, Ed.D. New York University, 1958

Chairman: Professor Harvey Zorbaugh

This is a study of the homemaker as she functions in the community Homemaker Service of the Jewish Family Service of New York City. This service provides a homemaker, a woman employed by the agency to take over the responsibility of running the house, during a family crisis, most often the mother's illness or absence from the home. This plan permits the father to continue to work and the children to remain at home.

The personalities of the homemakers, their attitudes and relationships to the family served are vital to the effectiveness of the service. This study was undertaken to explore how the interacting relationships between the homemaker and the members of the family which she served influenced the ways in which the homemaker service functioned. Investigator reviewed the documents on the historical development, administrative policies, procedures, and statistics of this service in the Jewish Family Service of New York City. Twenty-five cases typical of the most frequent personal, social, medical and economic problems encountered by the agency in requests for homemaker service were selected for intensive study after the investigator had read 150 agency cases in which homemakers had been placed. All cases were current during 1956 or 1957 and the service was requested because of illness or convalescence of the mother. In each case the father was in the home, the family income was between \$50 and \$100 a week, and there were minor children. Eighteen homemakers who had been placed with these families were interviewed individually, following two meetings of the complete staff of 55 homemakers during which spontaneous discussions were tape recorded. The Director and Supervisor of the Jewish Family Service Community Homemaker Service and the four caseworkers assigned to this Service were interviewed several times to obtain a clear picture of what the agency expected of the homemaker and how she functioned. Some personal data was obtained on all homemakers and detailed profiles were prepared of the eighteen Homemakers by Investigator and the Director of the Service.

This study provided information which supported assumptions A, B, and C of the study.

- A. When a homemaker enters a family for the purpose of giving homemaker service to that family, some form of interpersonal relationship will develop between the homemaker and members of the family.
- B. The homemaker, being a stranger who has come to help the family, will be accepted with ambivalence and mixed emotions.
- C. The presence of the homemaker will require adjustments in family attitudes, and behavior patterns.

The following conclusions were arrived at:

- 1. Most families misconceived the function of the Homemaker Service because, at the time the request was made, the applicants were too confused by the family crisis to hear the explanation.
- 2. The agency had succeeded in selecting homemakers with intelligence, sensitivity, and capacity to carry heavy assignments efficiently, but not without personal emotional strain.
- 3. There was a high degree of correlation between the homemakers identifications with families, positive or negative, and their own life experience. The investigator believes this can be utilized positively by the agency to match client-family and homemaker.
- 4. Long term assignments meant greater emotional involvement between homemaker and client family.
- 5. The homemakers needed, utilized, relied on, and requested more agency support to help them maintain their role and effectiveness in the home. Close working relationships with the caseworker helped sustain the homemaker against the emotional impact of seriously troubled families and established their status as agency staff members.

 Microfilm \$3.00; Xerox \$10.20. 229 pages.

SOME EFFECTS OF THE EMPLOYMENT OF MOTHERS ON FAMILY STRUCTURE

(L. C. Card No. Mic 58-3675)

Lois Norma Wladis Hoffman, Ph.D. University of Michigan, 1958

This study investigated the effects of the mother's outside employment on division of labor and power structure in the family. Measures of the dependent variables were based on children's questionnaire responses. The basic sample included 335 Detroit families having one child in elementary school. To highlight mother's employment as the dependent variable, eighty-nine of the working women in this group were matched to eighty-nine nonworking women on ideologies about male dominance, sex roles, and child participation; husband's occupation; number of children under thirteen years of age; age of oldest child; and school district lived in. The ideology measures were based on parental responses to a mail-in questionnaire.

It was found in the matched group, as well as in the total sample, that working mothers participated less than nonworking mothers in household tasks, and their husbands participated more. It was also found that parental endorsement of a traditional sex role ideology related negatively to the husband's participation. Further, when the mother's sex role ideology and employment status exerted parallel pressures, the effect of each was increased.

The matched groups of women were interviewed, and those who had started or returned to work since getting married reported the changes that resulted. Over 78 per cent reported that their husbands participated more, and gave details.

The data from the children's questionnaires seemed to indicate that children of working mothers participate less in household tasks than children of nonworking mothers. However, the working women interviewed reported that their employment resulted in their children's helping more than previously. It was, therefore, suggested that the personality of the mother who works more likely underlies the child's low participation than the working itself. Further analyses suggested that working mothers, compared to nonworking mothers, were less likely to impose responsibility on their children. They used milder discipline and were warmer, more helpful, and more supportive. Their children were more dependent and lower in intellectual achievement.

In defining power, two concepts were differentiated: area control and power. Area control refers to a person's control over an area of activity, whether or not this control has an important effect on others. Power is the degree to which a person makes decisions which affect others in an important way. It was predicted that working would lead to a decrease in the wife's area control and an increase in her power with respect to her husband. The former hypothesis was confirmed with the matched group and with the total sample. The latter hypothesis was confirmed only in the total sample. Further analysis suggested that the controls on husband's occupation and age and number of children accounted for the loss of the relationship.

Subgroup analyses revealed a strong positive relationship between employment and power for women who endorsed the male dominance ideology and for women who consistently rejected it, and the opposite relationship for women who showed a reserved rejection of this ideology. This pattern was found for the matched groups and the total sample.

It was concluded that the woman's employment leads her husband to assume some of her former tasks, and that an unfavorable ideology may lessen this response but not eliminate it. It was also concluded that to understand the relationship between the woman's employment and her power with respect to her husband requires consideration of other related variables, especially male dominance ideology. Microfilm \$2.95; Xerox \$10.20. 227 pages.

SOCIOLOGY, PUBLIC WELFARE

THE RELATION OF SOCIO-ECONOMIC AND CULTURAL FACTORS TO AN UNDERSTANDING OF ILLNESS

(L. C. Card No. Mic 58-5917)

Celia S. Deschin, Ph.D. New York University, 1958

Chairman: Professor Dan W. Dodson

This study was designed to test the hypothesis that admission of adults to the general medical wards of a public metropolitan hospital provides evidence of social imbalance related to the physiological inbalance for which hospitalization is sought. Clinical and teaching experience in the medical school affiliated with Kings County Hospital, where the study was undertaken, and examination of the literature of "the whole patient" had suggested that psychosomatic medicine did not include "the whole patient" despite its widespread acceptance as comprehensive medicine. Accordingly, clinical practice with a patient group not represented in the samples of psychosomatic medicine but which weights the morbidity statistics was examined to evaluate the significance of data from a sociological frame of reference for a comprehensive understanding of illness.

The primary data were collected, within 48 hours of admission, from a random sample of 100 patients, without reference to the admitting diagnosis, under actual hospital conditions as if obtaining social data were an integral part of the hospital's admission procedures. These data, obtained in a time-limited interview utilizing psychiatric casework skills, served as the basis for a comparison with the social data included in patients' medical charts, which were examined for clues to the underlying medical frame of reference. In the interpretation of the medical data, the collaboration of physicians was enlisted.

More detailed examination of current concepts of comprehensive medicine, in particular, justification of a psychological emphasis as correcting the somatic bias of scientific medicine stimulated an historical study of medical concepts, utilizing the evolution of Kings County Hospital from its almshouse origins in relation to the industrialization of Brooklyn as background against which to trace changes in medical thinking in response to developments in society as well as in medicine. A small portion is included in the present study to provide historical perspective, the importance of which is apparent when it is real-

ized that Cannon's researches antedated psychosomatic medicine by more than two decades and provided a basis for a comprehensive view of illness within a scientific frame of reference in which sociological data are considered necessary if the sources of emotional disturbances are to be discovered and treated.

The findings provide significant support for the hypothesis and suggest the importance of a follow-up control study utilizing a screening interview for evidence of social balance or imbalance as part of the diagnostic investigation. Of the 100 patients, ranging in age from 21 to 82, seventy-four were evaluated as having social imbalance, knowledge of which might have provided a more comprehensive understanding of illness: directly, through the possibility of clarifying inconclusive diagnoses; indirectly, through the possibility of making treatment more effective and preventing readmission. Forty-five illustrative case summaries are included. Of special significance is the fact that in these seventy-four cases, there is a preponderance of patients in the youngest age group, from 21 to 40.

The medical frame of reference reflected a dichtomized view of illness as either "organic" (i.e., physical) or "functional" (i.e., psychological) whereas the interview data provided insight into illness as a process involving the patient as a whole. Social data recorded by physicians in thirty-seven medical charts were not reflected in diagnoses, treatment plans or discharge recommendations. The lack of consideration of the social aspects of illness was interpreted as due largely to the psychological emphasis in clinical medicine.

The findings suggest the importance of historical perspective and critical examination of social and medical theory in both social work and medical education; also that for a comprehensive understanding of illness to become a reality, it is necessary that medicine be recognized as a social science.

Microfilm \$7.35; Xerox \$25.60. 580 pages.

SOCIOLOGY, RACE QUESTION

STATUS OF THE NEGRO IN CLEVELAND

(L. C. Card No. Mic 58-729)

William Franklin Moore, Jr., Ph.D. The Ohio State University, 1953

Franklin E. Frazier has pointed out the scarcity of data on the status of the Negro in the North. Yet, in 1947 Cayton listed Cleveland as one of the ten best American cities for Negroes, and the 1952 award of the National Conference of Christians and Jews was given to Cleveland for progress toward integration. One frequently hears Cleveland Negroes paraphrase the Chamber of Commerce slogan by stating that Cleveland is the best location in the nation for Negroes.

The purpose of the dissertation was to determine the status of the Negro in Cleveland, and to test to some degree Cleveland's rating as the "best location in the nation for Negroes." To make the study feasible it was decided

to compare Cleveland with two other Ohio cities, Columbus and Cincinnati.

A major methodological problem had to do with an instrument of measurement, and criteria of status from the Negro viewpoint. It was discovered that important pieces of research in race relations offer organized sets of criteria. Myrdal labeled his the "Rank Order of Discrimination," indicating that whites and Negroes rank them in about parallel, but inverse order. Myrdal admits that the list is hypothetical although based upon his general observations.

Spokesmen for Negroes have been more informative in their statements. For instance, Langston Hughes stated that "what I and thirteen million other American Negroes desire" can be summed up in seven "wants." The accuracy of his list is given substantiation by the statements of fourteen Negro leaders who were asked to write, for publication in a book, what they regarded as the demands of their people. These fourteen leaders showed a striking similarity of viewpoint and there was no significant deviation from the "wants" expressed by Hughes.

The seven wants of the Negro listed by Hughes, with the significant omission of intermarriage, show great similarity to Myrdal's "Rank Order of Discrimination."

Since Langston Hughes' list is in essential agreement with the other lists, was written by a Negro, and has the advantage of being positively stated, it was tentatively accepted as a valid criterion of status from the Negro viewpoint. To determine whether or not Cleveland Negroes valued the same goals in the same way, Hughes' list of wants was put in a questionnaire, but in a different order. That is to say, all resemblance to his rank order was destroyed. There was space for additional items. The respondents were requested to list all the items, including any they might have added, in the order of importance to them.

Arbitrary weights of 7, 6, 5, 4, 3, 2, and 1 were given to first, second, third, fourth, fifth, sixth and seventh place rank order positions. By so doing, it was possible not only to get a rank order of the various "wants" but also to determine the degree of difference in their importance.

At the bottom of each questionnaire were spaces to indicate residence at sometime in Cincinnati, Columbus, and Cleveland, and a question about which was "best" for the Negro.

It was assumed initially that there would be a high degree of consensus in the Negro population concerning the Negro's "wants"; nevertheless, an attempt was made to get a fairly representative cross section of the Negro population in Cleveland, using the socio-economic categories of domestic, unskilled, skilled, and white collar workers, equally divided between male and female. One hundred questionnaires were completed. In addition, twenty-five interviews were held, ten with professional men and women, by appointment, and fifteen with mechanics, barbers, elevator operators, cooks, students, etc., chosen by chance encounter or availability. The interviews were intended to serve as a sort of check on the validity of the question-naires.

The results of the questionnaire showed no significant deviation from Hughes' list of "wants," but did show some difference in the ranking of their importance. The only additional "wants" added in the spaces provided were generalized desires for complete equality. There were six such additions. The mean scores of the various items seem to indicate a definite heirarchy of wants so far as Cleveland Negroes are concerned.

The twenty-five interviews did not change the list of wants contained in the questionnaire, but eight of the professional people felt that decent housing ranked first. This is probably a reflection of the fact that many of the professional people had already achieved economic security. If this hypothetical explanation is correct, professional people would be in agreement with the majority of the rest of the sample who felt that economic opportunity was first in importance.

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In the absence of contrary findings, Hughes' list of "What the Negro Wants" was taken as a valid criterion of status for the Negro in Cleveland. It was assumed that Negroes in Columbus and Cincinnati would have the same wants.

The problems of observation, or collection of data, narrowed themselves to two--the collection of pertinent statistical data of an objective sort and the interviewing of people who knew and could reveal the more subjective data. Primary sources of statistical data included city, state, and national governmental records. The choice of whom to interview was determined by asking the executive secretaries of two Negro protest movements to name Cleveland's outstanding Negro leaders. Practically the same names appeared on both lists. The persons named, when interviewed, were also asked to name outstanding Negroes who could give the information needed. Again and again the same names appeared, with an occasional addition or omission.

Finally, to avoid an exhaustive expenditure of time and money, Cleveland, Columbus, and Cincinnati were compared statistically for the first three top ranking wants-first, second, and third choices, incidentally, of the national Negro spokesmen and the 100 Negroes sampled in Cleveland-in the belief that they would be trustworthy indices of the comparative status of the three cities.

Findings

The last item on the questionnaire was one involving a subjective rating of Cleveland, Columbus, and Cincinnati. Only eleven of the respondents had lived in Columbus or Cincinnati, but they, along with seventy-seven other respondents, considered Cleveland the best city of the three in terms of opportunity to achieve the wants rated on the questionnaire. Twelve respondents did not indicate a choice between the cities.

Specific findings relative to the status of Negroes in Cleveland are as follows:

1. A chance to earn a decent living, and at any trade or profession open to other Americans.

It was found that Negro status in the realm of economic opportunity has been and is now inferior, but the status relationship is a fluid one, with some evident gains in recent years.

In 1940, the percentage of white and Negro populations over 14 years of age and counted in the labor force were 55.8 and 55.6, respectively. Of the white labor force, 81.9 per cent were employed on other than emergency work, 6.0 per cent were employed on emergency work, and 12.1 per cent were seeking work. Of the Negro labor force, 59.6 per cent were employed at other than emergency work, 22.0 per cent were employed on emergency work, and 18.4 per cent were seeking work.

The kinds of jobs occupied by the two labor forces in 1940 perhaps reveal more accurately the relative status of

the two population groups. In 1940 the Negro population was nine and six-tenths per cent of the population, yet in no labor category above domestic service workers were they represented proportionately.

It was found that several historical factors have radically affected the status of Cleveland Negroes in the realm of economic opportunity during recent years. The years of armament manufacture, the National Fair Employment Practices Commission, and since 1950, the Fair Employment Practices Ordinance of Cleveland have opened new opportunities for Negro labor.

It was found that many jobs formerly closed to Negroes now have some Negro representation, the most obvious to the general public being sales and clerical jobs in all the large department stores. Negroes are being upgraded in some industries for the first time, and labor unions which formerly refused membership to Negroes now have a few. Segregation, in those industries which formerly practiced it, is being abandoned. This is true in the garment industry and the taxi organization.

On the professional level in 1951, it was found that Negroes comprised 1.6 per cent of the lawyers, 2.6 per cent of the physicians, 2.8 per cent of the dentists, and 9.2 per cent of the clergymen.

It is evident from these findings that status of the Cleveland Negro is inferior to the whites where economic opportunity is concerned, but it is also evident that his status is improving.

2. Decent housing (the right to own a home anywhere).

That section at the heart of the city known as Central Area has been the historical place of residence for most of Cleveland's Negro population. In 1920, Negroes were 21.0 per cent of the total population in Central Area, and 73.2 per cent of the Negro population was concentrated there. The concentration of Negroes in Central Area continued for the next two decades. In 1930, 61.2 per cent of the Central Area population was Negro, and 82 per cent of the total Negro population was there. By 1940, the Negro population had increased to 84,504, 9.6 per cent of the total population. Eighty-two per cent of it was in Central Area. During the same decades Central Area was becoming a slum area. In 1940, 37.8 per cent of its dwelling units needed major repairs. 10

During the same decades, however, the Negro population was gradually overflowing into adjacent areas formerly classified as "white areas" but now gradually vacated and opened to Negroes. The new areas, though more attractive than Central Area for residential purposes, are generally characterized as deteriorating areas.

It was found that white home-owners, real estate interests, and banks form a formidable alliance designed to contain the Negro population as nearly as possible in areas designated as "Negro." It was this policy of segregation which Cleveland Negroes most resented.

In spite of the segregation policies, however, several better residential areas have been opened to Negroes who have money enough to buy into these areas. It was found that the first Negroes to buy into these attractive areas did so by subterfuge and were subjected to many kinds of pressure designed to make them move out. When this failed, other whites began to sell to Negroes and the areas gradually became classified as Negro. Even with these new residential areas, Negroes occupied 34.5 per cent of

all Cleveland's substandard dwellings in 1950; about a fourth of them were labeled "dilapidated." ¹¹

Housing conditions are undoubtedly related to economic factors to a large degree, but policies of segregation play an important part in determining the opportunities Cleveland Negroes have for decent housing.

3. Equal educational opportunity.

Negro status, where educational opportunity is concerned, was found to be about on a par with the white population, so far as could be determined. In 1940, 65.0 per cent of the Negro population 5-24 years of age and 57.4 per cent of the white population within the same age category were attending school. A comparison of median years of school attendance of persons 25 years old and over, however, reveals a difference in achievement. In 1940 the median years of school attendance for the white population 25 years old or older was 9.5; for the Negro population in the same age category it was 7.5. 12

It was found that Cleveland Negroes consider they have equal educational opportunity, and that so far as could be determined there is no complaint against the public school system.

4. Are Negroes shown the same public courtesy that is normally accorded other citizens?

Admittedly highly subjective, there were nevertheless a considerable number of illustrations furnished by 25 persons interviewed. A study of the contents of the illustrations reveals that they can be grouped into several constellations: (1) differential courtesy where in-group and out-group relationships are concerned, and the Negro is made conscious he is a member of the out-group; (2) the categorizing of Negroes by such terms as "your people," the "Negro Problem," and similar all-inclusive labels; (3) being thought of as "different" and being subjected to humiliations because the thought is evident in conversations; (4) differential treatment in stores, where white clerks sometimes ignore Negroes and serve white customers; and, (5) differential treatment accorded Negroes when they apply for jobs.

It is evident from this research that Negroes in Cleveland consider their status inferior where this "want" is concerned.

5. Equality before the law.

Cleveland Negroes value highly the right of recourse to law for protection of their interests; yet at the same time they subscribe to the idea that Negroes are more liable to arrests than whites, and, once arrested, are more liable to being charged with a crime. Records of the Cleveland Police Department seem to support the latter idea but do not prove it. Since Negroes comprised only about ten per cent of the population, yet were charged with 64 per cent of the "Class I" offenses, and 26 per cent of the "Class II" offenses in 1950, it can be seen why they think Negroes are more liable to be arrested and charged with a crime than the whites. The only thing demonstrated, however, is that the Negro population contains more people apprehended in criminal activity.

Records of court convictions were not available, but executive secretaries of protest movements in Cleveland

think that Negroes get equal protection of their rights in the courts.

6. Full participation in government.

Cleveland Negroes consider themselves to have equal status where participation in government is concerned. They have had the ballot since the ratification of the Fifteenth Amendment and several Negroes have been elected to state offices. There is a former State Senator and there are two former State Representatives now practicing law in Cleveland. There are three Negroes serving as City Councilmen, and it is believed by Cleveland Negroes that they have a proportionate share of jobs in the city government, particularly those covered by Civil Service.

7. Social Equality insofar as public services go.

Cleveland Negroes feel that they have equal status so far as City and County agencies are concerned, and that public transportation is equally available to all.

Negroes can now get food and lodging in most downtown restaurants and hotels which handle transients guests, but there were several instances reported where the "treatment" had been given in some of the better restaurants. "Treatment" consisted of extremely slow and poor service.

Negro acceptance at places of recreation and entertainment varies considerably. Movie theatres do not have segregated audiences. Swimming pools operated by the City Recreation Department are not restricted, but most other pools are "private" when Negroes seek admission. Amusement parks, bowling alleys, and skating rinks are likewise "private" or "thoroughly booked" when Negroes seek admission.

It seems accurate to state that Cleveland Negroes have equal status insofar as public services paid for by taxes are concerned. They do not have equality in the realm of public services which are purchased.

A COMPARISON OF CLEVELAND WITH COLUMBUS AND CINCINNATI

The three cities compared are superficially quite similar. The percentage of the total population which is Negro in Cleveland is 9.4, in Columbus 11.3, and in Cincinnati 12.5. The age composition of the Negro population in the three cities is quite similar.

Furthermore, in each of the cities about three-fourths of the Negro population is concentrated in four wards. Other similarities and dissimilarities are revealed in the following comparisons of data from the 1940 Census.

A comparison of the employment status of Negroes in the three cities reveals that Cleveland ranks "best" with 37.1 per cent in labor categories above the domestic service category, whereas 28.6 per cent of the Negroes in Columbus and 26.2 per cent of the Negroes in Cincinnati are employed in labor categories above the domestic service category. 14

Equal opportunity to secure decent housing was second ranking want of Cleveland Negroes. Four wards in each of the cities contain the following percentages of the total Negro populations: Cleveland 74.0, Columbus 74.5, and Cincinnati 74.5. Negroes as percentages of the populations in the wards, however, varies considerably in the three cities. In Cleveland 71.0 per cent of the population in the

four wards is Negro, in Columbus 43.0 per cent, and in Cincinnati 54.7 per cent. Cleveland has 33 wards, Columbus 19, and Cincinnati 26, and so actual concentration is greater in Cleveland than in either of the other cities. A comparison of housing characteristics in the three cities, however, changes the significance of the comparison somewhat. In Cleveland's four wards 37.8 per cent of the dwelling units need major repairs, in Columbus 40.2 per cent, and in Cincinnati 69.0 per cent. It is assumed that Negroes have at least a proportionate share of dwelling units in these wards which need major repairs. Certainly these figures indicate the general condition of the areas occupied by Negroes.

It would appear from these figures, then, that in the procurement of decent housing Cleveland ranks "best," Columbus is a close second, and Cincinnati is last.

The third most important "want" which Cleveland Negroes indicated was "equal educational opportunity." The 5-24 age groups in Cleveland, Columbus, and Cincinnati contain 39.6 per cent, 39.3 per cent and 39.7 per cent respectively of the total Negro populations. Of those 5-24 years of age in Cleveland, Columbus, and Cincinnati in 1940, 65.0 per cent, 57.2 per cent, and 58.8 per cent were attending school in the respective cities. It would appear that Cleveland ranks "best" in percentage of the schoolage population attending school.

Median years of school attendance for Negroes 25 years old and over in Cleveland was 7.5, in Columbus 7.7, and in Cincinnati 7.0.¹² It would appear, then, that older Negroes in Columbus have been able to attend school two-tenths of a year longer than those in Cleveland.

Certainly the foregoing facts do not prove that Cleveland is the "best" city for Negroes to achieve their wants, but the facts tend to support the Cleveland Negroes' evaluation of Cleveland, at least so far as comparisons with Columbus and Cincinnati are concerned.

Microfilm \$2.00; Xerox \$5.60. 113 pages.

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SPEECH - THEATER

CREATIVE DRAMATIC ACTIVITIES IN THE ELEMENTARY CLASSROOM (PARTS I AND II)

(L. C. Card No. Mic 58-5916)

Dagny Hanson Blanchard, Ed.D. New York University, 1958

Chairman: Professor Alice V. Keliher

Contemporary elementary education, concerned with the maximum development of the child as an individual and as a member of society, emphasizes the importance of creativity in the educational process. Although the values of creative expression in general and dramatic activities in particular have been acknowledged, dramatic work in the elementary school has lagged behind that in other arts. Teachers lack training in dramatics and knowledge of materials needed to put theory into practice in the area of creative dramatics. This study was undertaken in an effort to fulfill these needs.

The purpose of the study was to ascertain and to describe principles and methods of using creative dramatic activities in the elementary classroom, and to prepare a guide for classroom teachers.

In order to achieve this purpose the problem was divided into the following five parts: (1) to identify the principles and objectives of elementary education; (2) to identify the objectives of creative dramatics; (3) to identify those principles and objectives which are common to elementary education and creative dramatics; (4) to describe materials and practices in creative dramatic activities that conform to the principles and objectives already identified; (5) on the basis of the objectives that were identified as common to elementary education and creative dramatics and the practices and materials found to conform to these mutual aims, to prepare a guide for the use of the classroom teacher.

A survey of the literature since 1929 on objectives of elementary education and creative dramatics was supplemented by a questionnaire to professors of drama. These data revealed that the common objectives were: to foster creativity, to develop emotional maturity, to provide for social growth, to establish moral and spiritual values, and to improve oral communication. In addition to holding these objectives in common with elementary education, it was discovered that creative dramatic activities provide a way of learning other subjects in the curriculum and may become the means of integrating many areas of study.

Practices in creative dramatics were located through the literature and by means of a questionnaire to teachers. The kinds of dramatic activities reported included pantomime, dramatic play, dramatization of stories and events, puppetry, and other related activities. In all these, emphasis was on the child and the creative process, not on the end result.

The guide for teachers was written with certain points of view derived from the study of the problem. These were:

- 1. Classroom teachers with no training in drama will find a guide describing creative dramatic activities helpful.
- 2. Creative dramatics may be considered an end in itself as an art expression; it may also become part of the learning process in other curriculum areas.
- Although the materials suitable for creative dramatics exist in the curriculum, they need to be identified.
- 4. The creative teacher will be able to guide children to artistic success in creative dramatics when she becomes familiar with some basic principles of the art.

Major chapters in the guide dealt with ways of beginning creative dramatics, drama as an art, dramatization of stories in the primary and middle grades, dramatization based on content subjects, and the integration of learning through creative dramatics. Illustrations of completed creative plays and a selected bibliography of reference and resource materials were included.

Microfilm \$2.85; Xerox \$9.80. 220 pages.

THE PREDICTIVE VALUE OF A BATTERY OF IMITATIVE ARTICULATION AND AUDITORY DISCRIMINATION TESTS IN THE SPEECH DEVELOPMENT OF KINDERGARTEN CHILDREN

(L. C. Card No. Mic 59-438)

Mary Stuart Farquhar, Ed.D. Boston University School of Education, 1958

This study attempted to determine the value of a battery of imitative articulation and auditory discrimination tests in predicting the speech development of two groups of kindergarten children.

Three hundred children were tested by a spontaneous articulation test and the results were scored according to the Wood Articulation Index. The 50 children who had misarticulated one sound in at least two positions and had the higher Articulation Indices were selected to represent the "mild" type of articulatory difficulty. The children who had the 50 lowest Articulation Indices were chosen to represent the "severe" type of articulation disorder.

Imitative articulation and auditory discrimination tests were administered to each child for each of the sounds he misarticulated. Imitative articulation ability was secured by means of examining the child's ability to imitate the correct form of a misarticulated sound in isolation, nonsense syllables, and words. Auditory discrimination ability was determined by a discrimination test of gross sounds; discrimination tests of the correct form of a misarticulated sound among vowels, acoustically dissimilar consonants, and acoustically similar consonants; and a discrimination test of (θ) in the initial and final position of words.

Seven months later the two groups were retested by the spontaneous articulation test. It was found that the amount of articulation improvement for the "mild" and "severe" groups was highly significant although no child in the sample had received speech therapy during the school year.

The "mild" group had significantly greater ability than the "severe" group in the imitation of the correct form of a misarticulated sound in isolation, nonsense syllables, and words; and significantly greater ability in the discrimination of the correct form of a misarticulated soundamong vowels and acoustically dissimilar consonants. As the children in the "severe" group had significantly inferior ability in discriminating the correct form of their misarticulated sounds in two of the three discrimination tests of speech sounds, it appears that auditory discrimination is a significant factor among children with functional articulation defects. Although the children with "severe" speech problems had less ability in auditory discrimination than the child with "mild" speech difficulties, the "severe" group's auditory discrimination ability was not related to the amount of improvement in articulation.

The ability to imitate the correct form of a misarticulated sound in words was related to the amount of articulation improvement within the "mild" group.

The ability to imitate the correct form of a misarticulated sound in nonsense syllables and words was related to the amount of articulation improvement within the "severe" group.

It appears that children who can imitate the correct form of their misarticulated sounds in nonsense syllables and words will tend to develop accurate articulation through maturation.

Of the 20 children administered the auditory discrimination test of (θ) in the initial and final positions of words, no child in either group was able to discriminate all of the (θ) words correctly. Twenty-five per cent of the sample was able to discriminate some of the (θ) words. The amount of improvement in ability to articulate (θ) in words does not appear to be related to the ability to discriminate (θ) in words as the children who made 100 per cent improvement of (θ) in the second test of spontaneous speech had zero discrimination scores.

The results of this study indicate that there is a relationship between imitative articulation and prognosis and that children with "severe" speech problems have significantly inferior ability in imitative articulation and in some

areas of auditory discrimination than children with "mild" speech problems.

Microfilm \$2.00; Xerox \$6.20. 129 pages.

DRAMA ACTIVITIES IN THE ELIZABETH PEABODY HOUSE IN BOSTON - A HISTORY AND EVALUATION

(L. C. Card No. Mic 58-7616)

George W. Fluharty, Ph.D. New York University, 1958

Chairman: Professor Fred C. Blanchard

The purpose of this investigation was to trace the history of drama activities in the Elizabeth Peabody House in Boston from 1896 through 1953, and to evaluate the role of these activities in the program of this settlement house.

The settlement movement, the primary purpose of which was to improve the lives of the underprivileged, has been since 1886 an important part of the social welfare field in the United States. Leaders early realized the value of drama in achieving their aims, and from 1900 through 1938 many houses included this activity. Because the Elizabeth Peabody House is a typical American settlement, and is one of the few emphasizing drama as a principal method of work, this study seemed important. It was made especially significant when it was learned that in 1958 Boston's West End would be redeveloped and the present quarters of the House abandoned and activities moved to a new community.

This study was concerned with the development of the settlement movement and its use of drama, and especially the history of the Elizabeth Peabody House and the role of drama in its growth. The historical method of research was followed. Complete records were made available and the cooperation of present and former House officials and participants in the drama program was excellent. The House's drama program was described, and appraised in relationship to the over-all program, to the achievement of its stated purposes, and to drama work in other contemporary settlement houses.

Although the House was founded in 1896 by individuals interested in the kindergarten method, the program soon included services for neighborhood people of all ages. Not until 1908 was drama included in the program; it played a minor role until 1913, when a new plant included a well-equipped theatre. After 1913 the House expanded drama activities within its total program, as well as its services to other drama groups using its facilities. For over four decades, Elizabeth Peabody House has been a significant drama and cultural center for the neighborhood and for Boston. The aims of the drama program - to give education, social experiences, and recreation - were largely achieved.

The enrollment in drama activities increased from fifteen in 1908 to several hundred during later years; it was led mostly by part-time paid leaders who lived at the House and by a large number of volunteers. Close supervision by staff officials after 1920 assured continuity. Although most of the work took place in clubs and classes where short plays and scenes were rehearsed and acting was studied, the House became best known for its public productions

of plays, operettas, and reviews. Teen-agers received the greatest emphasis before 1913, but adults and children predominated until the 1940's, when once again the program was adapted to teen-age members.

Extensive drama programs were curtailed in United States settlements after 1938 despite an apparent need in most of their communities and evidence of their value in achieving over-all purposes. Although Elizabeth Peabody House did better than most, it also had its troubles.

The two principal weaknesses contributing to this decline were insecure finances and inadequate leadership. Suggestions for strengthening the drama program were: (1) attempt to obtain financial aid from foundations, (2) use volunteer help carefully supervised by well-trained specialists, (3) experiment with new forms and methods, (4) broaden offerings and adapt them to neighborhood needs. It was recommended that the Elizabeth Peabody House, on moving to a new setting, continue its fifty-year policy of enriching the lives of the residents of its neighborhood by means of its drama program.

Microfilm \$4.20; Xerox \$14.20. 327 pages.

THE SPEECH ACTIVITIES OF FIRST COMMUNITY CHURCH, COLUMBUS, OHIO

(L. C. Card No. Mic 58-7975)

William Israel Gorden, Ph.D. Purdue University, 1958

Major Professor: N. B. Beck

Several types of communication have played a vital role in American Protestant churches, but critical studies have concentrated upon the preaching. This study was undertaken to investigate discussion, personal interviews, and printed matter, as well as the preaching, and to evaluate the comparative effectiveness of these several communication media used by an important Protestant church.

First Community Church, Columbus, Ohio with 5,900 members and \$365,000 annual budget in 1958, was the church selected because of its extensive use of these media of communication and because of the national recognition which this church has received.

The specific problem of the investigation was to ascertain the nature of the communications activities of the church and their relative effectiveness in providing the guidance in the various areas of living which was the objective of the church. The investigation included a rhetorical analysis of the sermons of Dr. Roy A. Burkhart, senior minister of the church who has done two-thirds of the preaching, and a descriptive survey of the other speech activities of the church. This survey included interviews with 17 members of the staff and 40 members of the congregation; questionnaires sent to all members who were parents of children up to college age (total number 672, of which 339 were returned), and personal observation of all types of the church speech activities by the investigator.

The preaching was found to have been the most important reason for church attendance, the most attended activity of the church, and the most important church activity in providing guidance for living. It was rated well above

average by the great majority of those questioned, and was characterized as interesting, informative, conversational, and problem-solving.

The groups were found to be the second most popular activity, with almost three-fourths of those questioned stating that they attended some group. The lecture-forum was a much-used procedure, especially in the Parents' Workshops. The answers to the questionnaire and an evaluation by the investigator on the William Utterback chart showed that the discussions were valued by the majority of the participants. They indicated that the discussions were lively and friendly and gave real help in living. The participants stated that they felt free to comment, but the investigator observed that in many meetings the group leader did most of the talking and was the only member of the group who had prepared for the discussion.

Personal counseling and visitation was ranked slightly below the Group Ministry by the members questioned. Those who had been ill or had experienced the death of a member of the family or of a close friend indicated that the personal ministry was very helpful at those times. Interviews were easy to secure, and rapport was high during the counseling sessions.

Printed communications were ranked generally slightly lower than the other three types as a medium through which guidance was believed to have been received, but it was ranked high in the areas of financial support of the church and time of bereavement. About half those questioned indicated they read church-supplied literature at least once a week.

Those who were members 10 years or more consistently indicated more participation in the activities and more guidance received than those who were members for less than 10 years. The areas of living in which the majority who returned the questionnaire indicated most guidance received were philosophy of living, religious growth, peace of mind, character building, and human relations. The areas in which many indicated least guidance received were choice of vocation, financial problems, health, and citizenship. Microfilm \$2.85; Xerox \$9.80. 219 pages.

PRE-VICTORIAN ROMANTIC MELODRAMA

(L. C. Card No. Mic 59-716)

Stanley Kahan, Ph.D. The University of Wisconsin, 1959

Supervisor: Professor Ronald E. Mitchell

This study examines a form of the popular drama of the London theatres from 1790 to 1837, which may be classified as the "romantic melodrama." This term is used to describe both the technique and content of this particular form. Before the evaluation could begin, it was first necessary to define the terms "romantic," "melodrama," and "Gothic," the last term being used originally in contradistinction to the classic drama in order to distinguish the new "Romantic Revolt."

Before the examination of the many writers of melodrama could be undertaken, it was also necessary to evaluate (1) the influences which shaped the development of the romantic melodrama and (2) the literary and dramatic antecedents which paved the way for the ultimate reign of the romantic melodrama on the London stage. The first aim was accomplished by studying the state of the theatres, the audiences, and the production techniques which aided in the development of the popular and spectacular drama. Literary influences upon the romantic melodrama developed from the French and German drama and the English Gothic novel and drama of the late eighteenth century.

In examining the romantic melodramas, through a larger appraisal of the melodramatists of the period, it became apparent that certain techniques and themes were constantly used, with little variation. These themes were:

- 1. The Robber Theme (Noble and Ignoble)
- 2. The Foundling Theme
- 3. The Captive-in-the-Castle Theme
- 4. The Usurper (or Villain-in-the-Castle) Theme
- 5. The Ghost Theme (Real and Imagined)
- 6. The Monster Theme
- 7. The Animal Theme
- 8. The Nautical Theme
- 9. The Secret Tribunal Theme

The plays classified as romantic melodramas were only rarely constructed on a single theme; more frequently, their plots were elaborations of many of these popular themes in interesting combinations. Except for certain superficial changes, the romantic melodrama remained unchanged during the first half of the nineteenth century.

It was also apparent that the melodrama was a popular form in the English Theatre before the introduction of the term by Thomas Holcroft in $\overline{1802}$. It evolved from many sources and when it developed its fairly rigid form, it proved to be so highly successful that playwrights were reluctant to alter it.

Attempts at serious drama by the poets of the period were even less successful than attempts by amateur men and women of letters. The popularity of the romantic melodrama, in many cases, forced many of these "serious" writers to simulate techniques they professed to abhor and almost all of these dilettantes lacked the technical skill necessary to write competent stage drama.

It may be perceived through the study of the several romantic melodramas of the period that the lack of interest in the period by theatre historians is not unwarranted. It should be apparent, however, that a study of this period, and its most popular dramatic form, will serve to clarify the contributions of later theatrical artists, especially Robertson, Pinero, Jones and Shaw.

Microfilm \$6.85; Xerox \$24.00. 538 pages.

AN EXPERIMENTAL STUDY OF THE FREQUENCY OF STUTTERING IN RELATION TO CERTAIN GOAL-ACTIVITY DRIVES IN BASIC HUMAN BEHAVIOR

(L. C. Card No. Mic 58-7446)

Donald Franklin Kline, Ph.D. University of Missouri, 1958

Supervisor: Charlotte G. Wells

To determine the possible relationships between the frequency of stuttering and words that had been grouped to

signify certain goal-activity drives in basic human behavior, a word-association test was administered to an experimental group of twenty-three stutterers and to a control group matched in age and sex. Two experimental sets were designed for the experimental group; the control group was tested under the first experimental condition only. In the word-association test, composed of six groups of words, four of the groups were made up of words selected to signify activities related to speech, security-seeking, obstacle-surmounting, and sex. The other two groups contained words selected by the stutterers as "problem" words and words that were assumed to be neutral.

Experimental Set I was designed to elicit an immediate verbal response to stimulus words included in the test; Experimental Set II was designed to elicit a verbal response following a delay of five seconds between the presentation of a stimulus word and a signal to respond. The experimental sets were designed to obtain data that served to answer the following questions: (1) Will word-groups signifying certain goal-activity drives in basic human behavior be equipotential in eliciting stuttering? (2) Will the strengths of anxiety, as shown by the physiological responses measured, differ significantly with the various goal-activity drives? (3) Will the physiological responses elicited by the word-groups correlate significantly with the number of stutterings in the verbal responses? (4) Will the physiological responses made by the stutterers differ significantly from those made by the non-stutterers?

Within the scope of the experimental design, the questions stated above were tested. A polygraph was used to provide continuous and simultaneous recording of physiological responses, and a tape recorder was used to record the stimulus words and the verbal responses. The data gathered were treated statistically to determine significant differences.

The basic questions that served to guide this investigation were answered affirmatively, according to the data obtained. Stutterers, insofar as the stutterers used in this investigation were typical of the groups they represented, will probably stutter in differing amounts on the several word-groups that were selected to signify goal-activity drives. Moreover, varying degrees of physiological responses from non-stutterers as well as stutterers can be elicited by the word-groups; and, for the stutterers, the strength of anxiety, as measured by galvanic-skin-response and reaction time, will correlate significantly with the frequency of stuttering. In addition, stutterers responding verbally to the word-association test employed in this investigation will have more anxiety than non-stutterers, if the physiological measures used were true indicators of anxiety levels. The major conclusions, supplemented by observations, supported some of the implications of recent studies of anxiety build-up, adaptation, consistency, and

The present study suggested that therapy should be directed toward helping the stutterer understand the anxieties prompted by what he says—or would like to say—and by what is said to him. The clinician should lead the stutterer to an understanding of his apparent fear of speech-related words and to an understanding of his inclination to stutter more often on words related to certain goal—seeking tendencies in basic human behavior. If the stutterer can objectify his attitudes toward speech and speaking, he may be able to reduce his anxiety and thereby reduce his need to control it. Hence, he may be able to reduce the frequency

of stuttering or perhaps approximate normal non-fluency, if these are his goals.

Microfilm \$2.40; Xerox \$8.40. 181 pages.

THE THEATRICALITY OF JAMES M. BARRIE: AN ANALYSIS OF HIS PLAYS TO DETERMINE THE SOURCE OF THEIR EFFECTIVENESS IN THE THEATER

(L. C. Card No. Mic 58-7402)

William Ralph McGraw, Jr., Ph.D. University of Minnesota, 1958

Although James M. Barrie's stature as a literary figure has been open to question, particularly within the last thirty years, his effectiveness in the theater has, in large measure, been unquestioned. For this reason it seemed appropriate that some investigation be undertaken to determine the specific causes for his theatricality.

The first chapter contains a brief discussion of the major external influences in Barrie's life which appear to have had some bearing on his writing, and in particular his peculiar type of imagination. Among Barrie's associations the most important figure was his mother. It was she who was chiefly responsible for his special kind of imagination which included a marked sense of play. Other names, too, stand out as important in shaping Barrie's attitude toward the theater, among which are Charles Frohman, Henry Irving and Maude Adams.

The second chapter surveys the critical and popular reaction to the plays, first, in order to substantiate the belief that Barrie's work is theatrically effective, and second, to point up the occasional disparity between the opinions of literary critics and those of play reviewers. It was discovered that the reviewers reflect mass public support and admiration, whereas the commentary supplied by literary critics, who wrote quite often removed from the occasion of production, displays a pronounced negative disposition.

The remaining chapters undertake to analyze the playwright's dramaturgy with the specific purpose of determining the techniques he employed in the handling of character, dialogue, dramatic action and the physical stage.

An analysis of Barrie's characterization reveals that it is a major contributing factor to the theatricality of his plays. Because of the dramatist's innate sympathy for mankind his characters elicit a quality of intimacy which serves to involve the audience emotionally. They are people who seem to be guided more by their emotions than their intellect and in this respect differ noticeably from Shaw's people who are invariably motivated by ideas.

Barrie's dialogue, as shown in the study, plays a less significant role in the total theatrical effect, and although it grows naturally out of character and action, it never resembles the "naturalistic" dialogue of such dramatists as Galsworthy and Pinero.

On the other hand, careful investigation disclosed the fact that dramatic action, especially as it is manifested visually and aurally, serves as a primary element in Barrie's theatrical formula. And it is chiefly because of this distinctive concept of action that he calls so heavily upon the physical properties of the stage. He uses them in a

way that reflects the influence of not only the 19th century theater of machinery, but also the traditional masque.

Important to the analysis is the comparison of Barrie with his fellow playwrights. For two reasons the most extensively quoted among these is George Bernard Shaw, first, because he was the most important English dramatist writing contemporaneously with Barrie, and second, in many ways his dramatic works typify the greatest contrast with Barrie in both method and purpose.

Finally, as a direct result of the foregoing, it was concluded that Barrie's plays, to a much greater degree than those of most successful dramatists, demand the theater for their proper materialization. When they are read and analyzed in the study by the modern critic they suffer appreciably under objective scrutiny. But with a stage, an audience, a darkened auditorium and all the concomitant psychological factors Barrie impressively succeeds, for he is then encountered on his own ground.

Microfilm \$2.75; Xerox \$9.60. 211 pages.

SOME BUSY FEDERAL AIRWAYS VOICE COMMUNICATIONS: AN ANALYSIS

(L. C. Card No. Mic 58-7530)

Stephen Peter Reinertsen, Ph.D. The University of Wisconsin, 1958

Supervisor: Professor Henry Lee Ewbank

A. The Problem

U. S. air traffic is increasing about 15% annually. The 2-way radio networks which connect pilots with traffic controllers are becoming increasingly overcrowded—especially in major terminal areas during peak traffic hours. This research project analyzed recordings of voice communications between pilots and controllers in the New York, Washington, D. C., and Chicago areas, to determine rates of flow, quantities and purposes of information exchanged, and indices of communicating trouble.

B. Procedure

151 hours of recordings were measured for channel density (percentage talking time). 4 types of channels were represented: terminal approach control, terminal departure control, airport tower, and enroute reporting channels. 20 of the busiest 15-minute periods, ranging from 60% to 92% channel density, were selected for detailed analysis, and transcribed into written form. Words and phrases were grouped into categories according to purpose-types of content. For each period, category word totals were computed as percentages of the total word count, or percentages of total talking time. Statistical investigations were made of the possible influences upon category results of channel types, channel densities, number of aircraft under control, and controller differences.

C. Averaged Results for All 20 Periods

1. Pilots' average speaking rate was 149 W.P.M.

- 2. Controllers' average speaking rate was 240 W.P.M. (One was 290)
- 3. Although controllers spoke 65% of all words, they used only 54% of the total talking time.
- 4. Average message length was 3.9 seconds.
- 5. The total word count was distributed among these purpose-type categories, as follows:
 - a. Instructions and advisories concerning the control of air traffic-----33.2%
 - b. Talk about aircraft whereabouts----- 8.2%
 - c. Formal ATC clearances (aircraft routing instructions) ----- 5.9%
 - d. Words requesting a., b., and c., above ---- 6.1%
 - e. Talk about weather ----- 3.1%
 - f. Call-sign identifications-----22.6%
 - g.* Message acknowledgements----- 7.9%
 - h. Routine talk about the communicating process ----- 3.3%
 - i. Talk about communicating difficulties----- 1.3%
 - j. Talk about traffic delays being experienced-- 3.5%
 - k. Words which the originator either corrected, or advised the listener to disregard ----- 1.2%
 - 1. Saying "ah" ----- 2.8%
 - m. Courtesy words ----- 0.8% 100%
- 6. Percentages for individual 15-minute periods generally agreed with the averaged percentages.
- 7. Where differences in individual results were noted, they most frequently were related to differences among controllers.
- 8. Results agreed with earlier, similar research (1952-1954), except that channel densities and speaking rates have now exceeded theoretical maximums listed by earlier research.

D. Conclusions

Speaking rates were very rapid, without adversely affecting intelligibility.

Slightly more than one-half of all words were directly concerned with air traffic control; the remaining words were concerned with communicating processes such as identifying, switching, and repeating.

Controllers tended to dominate the channels—the pace, the larger percentage of talking, setting phraseology patterns, and maintaining circuit discipline.

Comparisons of periods were characterized more by similarities than by differences.

There was little evidence of channels "breaking-down" when communicating and traffic pressures increased. Communication difficulties never accounted for more than small percentages of the total word count.

From the evidence, the procedural and phraseology frameworks appeared to be sound. To increase communicating efficiency, some of the necessary procedures and phraseologies likely can be simplified, and a few of the apparently unnecessary ones eliminated—subjects for further research.

An annotated Bibliography of 92 entries is included.

Microfilm \$2.35; Xerox \$8.20. 179 pages.

*Many call-signs were used for purposes of acknowledging messages. If call-sign acknowledgements are added, the message acknowledgement percentage is 17.9%.

THE SPEECHMAKING OF HARRY S. TRUMAN

(L. C. Card No. Mic 58-7450)

Edward Alexander Rogge, Ph.D. University of Missouri, 1958

Supervisor: Bower Aly

"The Speechmaking of Harry S. Truman" is a rhetorical study of Truman's development as a speaker and of his use of public speaking to win office and to fulfill the responsibilities of the offices which he won.

The introductory chapter describes the purposes, sources of material, and some of the problems encountered in this study of a contemporary figure.

The second chapter concerns Truman's early life, with special attention to his heritage, education, military career, business experience and other activities which influenced his public speaking.

Chapter III considers Truman's four campaigns for county court judge of Jackson County, Missouri--an administrative position--and his efforts for bond issues and reorganization proposals offered to improve his native county.

Chapter IV is devoted to Truman's campaigns for the United States Senate and to his speaking during the years he served as a legislator. In 1934 he campaigned successfully for the Senate. Six years later he won renomination in a bitterly-fought primary and re-election in the general campaign.

During his first term in the Senate he spoke almost exclusively of transportation problems. With the founding of the Truman committee--a "watchdog" committee established to guard the country's expenditures for the war effort--Truman frequently talked of the problems of military preparedness.

The next chapter concerns Truman's campaigns in 1944 for Vice President, in 1948 for President, and in 1952 for the election of Adlai Stevenson. Special attention is given to the 1948 election when Truman—as he had done in 1940—upset confident predictions of his defeat.

Chapter VI considers Truman's presidential speaking from April, 1945, until he left the White House in January, 1953. Truman often spoke to Congress and to the nation about problems of domestic legislation and of foreign policy. He often addressed organizations and groups, and he frequently spoke at ceremonial occasions. Ordinarily he utilized even the ceremonial occasions to fulfill his responsibilities as the nation's chief legislator and foreign policy maker.

Although Truman delivered hundreds of addresses as

President, none of his presidential speeches aroused extensive acclaim as a great address. However, because many of his addresses constituted momentous policy statements they are insured perpetuity.

As a speaker Truman will doubtless best be remembered for his hard-hitting campaigning. In Jackson County he developed techniques for speaking which he later applied successfully to Missouri and to the nation. He learned to speak without a manuscript; he learned to speak of issues and facts in a plain, unadorned style; and he learned to relate his arguments to the self-interest of his listeners. In his Jackson County campaigns, as in his later campaigns, he created a marked impression of sincerity.

Truman's most effective speeches, those fully adapted to an immediate audience and delivered in his colloquial, vigorous style, make poor reading even now. Truman, however, would probably not be distressed if none of his political speeches is remembered. He evaluated a speech by how well it helped to accomplish the task at hand, not by how well it would read ten, twenty, or a hundred years later. His campaign speeches, especially in 1948, helped to accomplish the task at hand.

Microfilm \$7.60; Xerox \$27.00. 599 pages.

A COMPARATIVE STUDY OF STUTTERERS' LEVELS OF ASPIRATION FOR SPEECH AND NON-SPEECH PERFORMANCES

(L. C. Card No. Mic 58-7452)

Thelma Woodhouse Trombly, Ph.D. University of Missouri, 1958

Supervisor: Charlotte G. Wells

The purposes of the study were to compare stutterers' goal behavior for speech and non-speech performances, to inquire into the possibilities that their goal behavior might be related to attitudes toward speech or severity of stuttering, to observe the effects of success and failure in speaking on the fluency of subsequent speaking, and to investigate the influence of a non-speaking pressure situation on fluency in oral reading. Five null hypotheses bearing on the purposes of the study were formulated.

Thirty stuttering subjects participated in the study. Their ages ranged from 13 to 54 years, their mean age being 21.5 years. Twenty-six were males, and four were females.

The study was conducted by means of the level of aspiration technique, which is designed to investigate methods of goal-setting, ways of seeking success and avoiding failure, and modes of reaction to attainment and non-attainment of goals. The subject is presented with a task and with a scale for measurement of performance and is then required to set a goal, in terms of the scale, for his performance in each of a number of trials. His modes of reaction make possible the derivation of a number of scores relating to his goal behavior.

Two level of aspiration tests were prepared, one a speech test and the other a graphomotor test. The same ten-point scale was used to evaluate excellence in each. Fourteen scores were computed for each test. Attitude toward speech was measured by scores on the Knower Speech Attitude Scale, and severity of stuttering was rated objectively by each subject's therapist on a seven-point scale and subjectively by each subject on a five-point scale. Relative fluency in speaking after successful and unsuccessful speaking was determined by comparing fluency in speech test items following successful trials with that in items following unsuccessful trials. For the purpose of comparing fluency in oral reading just before and just after a non-speaking pressure situation, two twohundred word reading paragraphs were prepared and equated for difficulty by means of Brown's word-weighting formula. Each subject read one paragraph just before the graphomotor test and the other on completion of the test. Individual interviews were conducted after testing.

Only five of the level of aspiration scores represented goal behavior that was significantly similar for the two tests, and only three represented behavior that was extremely dissimilar. Attitude toward speech was significantly and negatively related to three of the speech scores and significantly and positively related to one of the graphomotor scores. Severity of stuttering, whether rated by the therapists or by the subjects, was not significantly related to any of the level of aspiration scores. The subjects stuttered significantly more in speaking following success than in speaking following failure. This tendency was most pronounced in subjects whose overt stuttering was moderate. The subjects also stuttered significantly more, as a group, in oral reading before the graphomotor test than in reading after it. Again, the tendency was most pronounced in subjects with a moderate amount of overt stuttering. Subjects with severe problems showed a trend in the same direction, and subjects with extremely mild problems showed a trend toward more stuttering in reading after the test than before it.

The aspiration behavior of the subjects was fitted into the total response patterns developed by Rotter, and data obtained from these classifications were combined with the score data for the purpose of formulating conclusions.

Microfilm \$3.90; Xerox \$13.20. 302 pages.

EXPERIMENTS DESIGNED TO DETERMINE THE SITE AND MECHANISM OF ACTION OF RESERPINE IN THE PRODUCTION OF GASTRIC SECRETION IN DOGS

(L. C. Card No. Mic 58-7816)

Walter E. Barrett, Ph.D. Princeton University, 1958

Reserpine, an alkaloid isolated from the plant Rauwolfia serpentina Benth. is responsible for the major pharmacological activity of extracts prepared from this species of Rauwolfia. After an intravenous injection reserpine elicited a flow of gastric secretion in the unanesthetized dog.

In an effort to localize the site and mechanism of action of reserpine in the production of gastric secretion, reserpine was studied for its effects on gastric secretion in unanesthetized dogs which possessed a surgically prepared gastric fistula and Heidenhain pouch. Reserpine injected in both types of dogs in doses of 2.5 to 50 microgrm/kgm of body weight induced a flow of gastric secretion from both the gastric fistula pouch (the vagally innervated pouch) and the Heidenhain pouch (the vagally denervated pouch). The rate of secretion from both pouches was essentially the same. The gastric secretion evoked by these low doses of reserpine continued for more than five hours. Thus reserpine appeared to be one of the most potent stimulants of canine gastric secretion described to date.

The ganglionic blocking drugs hexamethonium and Ecolid were found to inhibit the reserpine induced gastric secretion. The peripherally acting anticholinergic drug Antrenyl also inhibited the reserpine evoked gastric secretion.

In acute experiments with the anesthetized dog, bilateral cervical vagotomy did not prevent the gastric secretion evoked by reserpine. In the same type of experiment, acute bilateral cervical vagotomy plus a transection of the spinal cord at C-6 failed to prevent the reserpine elicited gastric secretion.

Experiments with tetramethyl ammonium bromide, a known depolarizing drug, produced a gastric secretion from both the gastric fistula and the Heidenhain pouch. This response was inhibited by the ganglionic blocking drug, hexamethonium.

Based on these results it was postulated that reserpine induced a flow of gastric secretion by a depolarization of the parasympathetic ganglia present and functional in both the gastric fistula and Heidenhain pouches.

Reserpine caused a contracture of the isolated rectus abdominis muscle of the frog. This response was characterized by a slow, progressively developing contracture of the muscle and thus differed from the immediate type of contracture evoked by the known depolarizing drugs, acetylcholine, nicotine and decamethonium. Reserpine decreased the response of the rectus muscle to these three depolarizing drugs. Reserpine also differed from decamethonium in that it failed to cause a contracture of the avian muscle.

A general hypothesis was developed which indicated that reserpine induced gastric secretion in the dog by a stimulation of the parasympathetic ganglia found in both the gastric fistula and the Heidenhain pouch. The results obtained with the blocking drugs and with the experiments on the isolated rectus abdominis muscle of the grog suggested that reserpine caused a depolarization or stimulation of the ganglia cells indirectly by a metabolic alteration of these nerve cells which lead to a prolonged or continued stimulation. It was suggested that such a mechanism might be applicable to the central nervous system and thus account for the parasympathetic predominance and sympathetic suppression seen in both experimental animals and in the human patient.

Microfilm \$2.00; Xerox \$4.20. 79 pages.

FILOPODIAL MOVEMENT IN CYPHODERIA AMPULLA (EHR.)

(L. C. Card No. Mic 59-700)

Robert Everett Berrend, Ph.D. The University of Wisconsin, 1959

Supervisor: Lowell E. Noland

Cyphoderia ampulla, a testacean rhizopod, was maintained in the laboratory and used for investigations regarding the structure and function of its filopodia.

A series of experiments wherein the organism was exposed to single salt solutions of Na, K, Ca and NH₄ (0.004 N, 0.006 N and 0.008 N) indicated that the monovalent ions reduced the viscosity of the protoplasm of the filopodia. The divalent ion of calcium had little effect on the viscosity of the protoplasm but appeared to increase the organism's sensitivity to light. Animals were exposed to each salt solution at pH values of 4.4, 6.6 and 7.2, except for the calcium which in the method used could not be maintained at a value above pH 6.6. The higher hydrogen ion concentrations in all salts resulted in the non-directive filopodia being excessively attenuated by the forward movement of the organism. This was probably due to increased adhesiveness and a slight increase in the viscosity of the pseudopodia.

By study of the effects of the ion solutions and by phase microscopy the structure of the filopod was found to be similar to that of reticulopodia. The rheoplasm, an actively flowing sol, is peripheral to the stereoplasm, a gelled core. This is contrary to the opinion of De Saedeleer (1932).

Observation supports the application of the active sol streaming theory of Frey-Wyssling (1947) and of Loewy (1949) to the formation of the filopod and to movement of the animal. The theory states that streaming is the result of contraction of protein molecules which are temporarily

bound to a reaction surface. The shifting of bonds and extension of the molecule will produce protoplasmic streaming if enough molecules are in phase.

It is suggested that the stereoplasm serves as the necessary reaction surface for the streaming rheoplasm which by distal gelation in turn elongates the axial core.

Movement of the organism takes place commonly along a single filopod, the directive. This movement is accomplished by the streaming of the protoplasm at the base of the filopod against the stereoplasm of the directive. Since the core of the directive is not free to move toward the animal, being fastened at intervals to the substratum, the animal pulls itself along the filopod.

Microfilm \$2.00; Xerox \$4.40. 81 pages.

A PHYSIOLOGICAL STUDY OF THE LOZENGE PSEUDOALLELES IN DROSOPHILA MELANOGASTER

(L. C. Card No. Mic 58-759)

Arthur Chovnick, Ph.D. The Ohio State University, 1953

It has been proposed that the phenotypic similarities and position effects of pseudoalleles may be explained by the hypothesis that such loci are concerned with successive steps in a chain of reactions which occurs at the site of the genes in the chromosomes:

Localization could be the result of limited amount or nondiffusibility of the intermediate A. The sequence of reactions would then proceed to completion only if the wild alleles of the adjacent loci are on the same chromosome, but not if they are on the different members of a pair of homologues.

This hypothesis seems not to be contradicted by position pseudoalleles with morphological effects in <u>Drosophila</u>, and indeed has led to the discovery of pseudoallelism among certain clones of biochemical mutants in <u>Aspergillus</u>.^{1,3,4} It is a particular form of the "kinetic" hypothesis of position effect, a hypothesis which attributes position effects to the interactions of products of neighboring genes.^{5,6}

Stocks

The lozenge mutants in <u>Drosophila melanogaster</u> have been demonstrated to occur at three closely linked loci on chromosome one. The major effects of these mutants are on the eye, and they exhibit the phenotypic characteristics of pseudoalleles including position effects. There are also pleiotropic effects on female fertility, tarsal claws, pulvilli, and antennae.

The three lozenge mutants (BS, 46, and g) were made available to the investigation in stocks provided by M. M. Green. These stocks possessed X-chromosomes with one, two, or all three of the mutants together with sn³ and v, balanced over C1B; sn³1z*v/C1B. For purposes of comparison it was necessary that the mutants be placed on a coisogenic background. The background chosen was that of the isogenic Oregon-R (Series I) stock developed by Jack Schultz.

The derivation was accomplished in two steps. First, the lozenge segment of each of the X-chromosomes was inserted into the X-chromosome of the Oregon-R stock. In each case this was achieved by two successive crossovers between the 1z X-chromosome and the Oregon-R X-chromosome, one in the region between sn and 1z, and one in the region between 1z and v. When this step was completed, Oregon-R autosomes and Y chromosome were introduced into each of the 1z stocks by means of the familiar "dominant marker-crossover inhibitor" technique.

Two approaches were made to the study of gene action at these loci. Previous immunogenetic studies of Drosophila have been successful in demonstrating the interaction of non-allelic loci in the determination of antigenic specificity. ^{8,9,10} The first approach makes use of these techniques. A second approach to the study of the action of these loci was through an examination and evaluation of the effects of these loci on the development of the tarsal claws. In both studies, the effects of the lozenge loci were studied in homozygotes and heterozygotes.

The results of both studies appear to have several common features. In general, these features are inconsistent with the hypothesis of localized linear sequence of pseudoallelic gene action.

The first postulate of that hypothesis is a sequence of reactions, the successive steps of which are carried out by the adjacent loci of a pseudoallelic series. Contrary to this postulate, the evidence from both the antigenic and claw studies of lozenge homozygotes favors the view that each of the loci acts independently of the others. The evidence from the study of claws in homozygotes suggests that the effects of the three lozenge loci on claw development are additive. The results of the antigenic study of homozygotes indicates that each locus produces its antigenic effects independently of the others.

The second postulate of the hypothesis states that the reactions mediated by pseudoalleles are localized at the chromosome segment in which they are located. This postulate is also contradicted by both aspects of the present study, but in this case by evidence from heterozygotes.

No position effect on antigenic structure is seen in the heterozygotes. Furthermore, an antigenic component, not present in any of the homozygotes, exhibits itself in both coupling and repulsion phase heterozygotes. Schemes of gene action which would lead to the production of such a component all involve interchromosomal interaction.

From the examination of claws in heterozygotes, a similar conclusion emerged. The suggestion was made, in connection with discrepancies between the effects of homozygous and heterozygous genotypes on claws, that the observations were attributable to mechanisms operating at two different levels of gene action. This suggestion is supported by the fact that the level of thresholds seen in the homozygote claw value distribution is altered in the repulsion phase heterozygote distribution, which may be considered as a reflection of an alteration in the specificity of the primary gene product as a result of interchromosomal interaction.

Thus, both aspects of the present study yield general conclusions which are similar, even though a striking discrepancy exists in connection with the absence of a position effect on antigens and its presence in claws as in eyes.

A further point of significance emerging from these studies is seen regarding the physiological differentiation of these loci. In the antigen study, it was noted that the simplest mechanisms of gene action shared one common feature, the physiological differentiation associated with the g locus. This is further confirmed in the analysis of the effects of genic substitution (homozygous) on the development of claws. It is seen here that the wild allele of g is considerably less effective in claw development than are the other two wild alleles.

With this evidence of genic differentiation from both the antigenic study and the claw development study, another detail in the development of the concept of evolution of new genetic material through duplication is strongly supported. This process begins with duplication which most likely occurs by unequal crossing over. Differentiation of the locus must occur as a phenomenon associated with the new position of the locus. This process not only affects the physiological activity of the locus, but also alters its mutational capacity. With mutation, further differentiation may occur, and finally, physical separation by chromosomal abberration occurs, which may give rise to still further differentiation. Microfilm \$2.00; Xerox \$6.40. 135 pages.

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Abstract published by special arrangement with The Ohio State University.

STUDIES ON THE HYDATID WORM, ECHINOCOCCUS GRANULOSUS, IN MISSISSIPPI

(L. C. Card No. Mic 59-663)

William Forrest Hutchison, Ph.D. Tulane University, 1958

Chairman: Paul C. Beaver

Since 1952 other workers have reported finding dogs naturally infected with the adult stage of the hydatid worm and humans, swine, and cattle naturally infected with the larval stage of the parasite in Mississippi. These recent findings of the hydatid worm in man and other animals points to its possible significance as a public health problem in Mississippi.

The present study was undertaken to determine the species identification of the hydatid worm present in Mississippi, the degree and extent of its endemicity, and to compare certain serologic tests used in diagnosing hydatid infection in man and other intermediate hosts.

A survey of Mississippi swine with naturally occurring hydatid infections showed there was a significant reservoir of infected hogs in many areas of Mississippi.

Rodents were not susceptible to infection with the larval stage of the hydatid worm and probably play no role in the life cycle of the parasite in Mississippi. The domestic cat, the opossum, and the raccoon were not susceptible to infection with the adult stage of Echinococcus granulosus. The fox, although it became infected with the adult stage of the worm, does not seem to be an ideal host as worms twelve weeks of age did not contain mature eggs.

Dogs were experimentally infected with the adult stage of the hydatid worm by feeding them larval scolices obtained from unilocular hydatid cysts in swine. The worms reached maturity in the dog, as evidenced by the passage of gravid proglottids, as early as forty-six days after inoculation, and even in infections of up to 1000 worms dogs did not show evidence of distress.

The morphology of the developing adult hydatid worm has been described and the species identified as <u>Echinococcus</u> granulosus based on morphologic characters present in the 4-week-old and 8-week-old worms.

Hydatid antibodies have been demonstrated by means of the hemagglutination test, the complement fixation test, and the precipitin test in the sera of swine and humans naturally infected with Echinococcus granulosus, in the sera of rabbits artificially immunized with hydatid antigens, and in a small series of experimentally infected sheep, goats, pigs, and calves. The hemagglutination test using swine hydatid cyst fluid as an antigen was more sensitive than the complement fixation or the precipitin tests in detecting hydatid antibodies.

An adjuvant technic of producing hydatid antibodies in rabbits was superior to injecting hydatid antigen alone and required less antigen and fewer injections to develop comparable hydatid antibody titers.

Agar diffusion studies using swine hydatid cyst fluid antigen and a human serum of high hydatid antibody titer demonstrated the presence of a minimum of three antigens in swine hydatid cyst fluid.

Microfilm \$2.00; Xerox \$5.60. 114 pages.

THE TAXONOMY AND BIOLOGY OF UTAH SPECIES OF BLACK FLIES (DIPTERA: SIMULIDAE)

(L. C. Card No. Mic 58-7955)

Bobbie Vern Peterson, Ph.D. University of Utah, 1958

Chairman: George F. Edmunds, Jr.

This study was undertaken in 1953 and continued for a period of five years. Primary attention was given to the genera Prosimulium, Twinnia, Cnephia and Eusimulium. Each of these species has received detailed treatment which includes the following: (1) reference to the literature that deals with the black fly fauna of Utah, and a historical taxonomic review; (2) detailed descriptions of the female, male, pupa and larva; (3) the known geographic distribution through Utah and western North America; (4) biological data, including notes on the larval and pupal habitats, seasonal occurrence of immature and adult stages, and mating, feeding, and oviposition habits of the adults.

Eight species are described as new, and three species, Eusimulium latipes, E. bicornis, and Simulium nigricoxum are listed as new state records. The state list now in-

cludes 42 species of five genera.

Keys to the seven North American genera are presented for the adult, pupal and larval stages. Other keys are provided to distinguish the female, male and pupal stages for species of the genera Prosimulium, Cnephia, Eusimulium and Simulium that occur in Utah. Verification tables to the adult female and male are given for each species of the genera Prosimulium, Cnephia and Eusimulium.

It was observed that mating of black flies, depending upon the species occurred at any time between emergence and oviposition. In some species (e.g., Cnephia dacotensis, C. eremities) mating usually occurred within minutes after emergence at the water's edge and without a mating flight. The fact that the eggs become mature in the pupal stage in these species, and the short life span necessitates that these species mate soon after emergence.

In species with a long interval between emergence and oviposition (e.g., Simulium decorum), it was observed that mating can occur at any time between emergence and oviposition.

Mating in black flies takes place on a support or in a mating flight. Although most species exhibited a single characteristic mating procedure a few such as S. decorum, illustrated more than one type of mating behavior which probably increased the chances of fertilization of the eggs.

The possible relationship of the structure of the male eye to the presence or absence of a mating flight is discussed. In species that have a mating flight, male upper facets are greater in size and number than in those species which mate without flying. Also, the proportion of large to small facets in the male compound eye of species that mate while flying is greater than it is in the males of species that do not have a mating flight.

The biting habits of black flies are unusual in that the females of some species bite in certain geographical regions while in other areas they are not known to bite. This may be explained, at least in part, by the fact that in some species nutrients stored in fat bodies during the larval stage are sufficient to allow complete development of one batch of eggs making adult blood feeding unnecessary. The larvae of certain other species produce stores of nutrients

in some localities, but in other areas are unable to develop a large enough fat body to provide for full development of the first batch of eggs. Females then must obtain blood in order to complete ovarian development.

The black fly species studied varied in their oviposition habits. Some dropped eggs directly into the water while in flight (e.g., the genera Prosimulium and Cnephia. Others hovered above streams and oviposited through a thin film of water that covered sand, rocks or vegetation (e.g., the genus Eusimulium, Simulium canadense, and S. pictipes). Some settled on some suitable water-lapped surface to oviposit (e.g., most species of the genus Simulium). A few species may employ one or more methods. The possible evolutionary trends in oviposition behavior agrees with the conclusions from morphological evidence.

Microfilm \$4.75; Xerox \$16.00. 371 pages.

SPERMATOCYTIC ULTRASTRUCTURE AND BASOPHILIA IN THE TESTIS OF THE CRAYFISH, CAMBARUS VIRILIS

(L. C. Card No. Mic 58-7408)

August Ruthmann, Ph.D. University of Minnesota, 1958

Major Adviser: Joseph Gall

The trilobed testis of the crayfish consists essentially of bulbous acini and associated ducts terminating in the vasa deferentia. The acini consist of a dense central packing of germ cells surrounded by a layer of follicle cells. Cytoplasmic extensions of the latter penetrate into the interior of the acinus and provide for cell to cell contact of each spermatocyte with at least one follicle cell. During spermatogenesis, the duct cells are selectively demonstrable by their intense staining with the periodic acid-leucofuchsin reagent.

Histochemical procedures for the demonstration of RNA have shown the presence of intensely basophilic bodies in the cytoplasm of the crayfish, Cambarus virilis. The staining of thick sections, cut alternately with thin sections for electron microscopy, has permitted identification of the basophilic bodies with two types of lamellar systems. One of these, a set of straight annulate lamellae, is restricted to meiotic prophase. The second type of lamellar systems has been found from late prophase to early spermatid stages. It consists of an ellipsoidal lamellar set which intersects a number of straight lamellae. Within the region of intersection, the ellipsoidal lamellae break up into an array of small tubules of about 150 A diameter. The term tubulate lamellar system was chosen to designate this type of lamellar complex. Small RNA-containing granules could not be detected in annulate lamellar systems. While there are a few granules in the marginal regions of the tubulate lamellar system, their distribution cannot be responsible for the basophilia which is intense within all regions of the lamellar body.

During both meiotic metaphases, the tubulate lamellar bodies are generally found in the vicinity of the spindle equator. The spindle is basophilic, but not to a higher degree than the surrounding cytoplasm. Elements of both the endoplasmic reticulum and fine filamenteous chromosomal

fibers enter into the construction of the spindle. Although cilia are absent in the crustacean body and the spermatozoon is without a flagellum, the centrioles at the poles show a structure identical with that described for kinetosomes and the vertebrate centriole.

Microfilm \$2.00; Xerox \$5.20. 103 pages.

FURTHER STUDIES ON THE OSMOTIC AND IONIC REGULATION IN THE CRAB, CANCER BOREALIS STIMPSON

(L. C. Card No. Mic 59-671)

Gino Angelo Trevisani, Ph.D. University of New Hampshire, 1959

Adviser: Dr. Dorothy F. Travis

The mechanisms by which <u>Cancer borealis</u> is able to regulate osmotically and ionically in various dilutions of sea water was studied. Animals were placed in artificial media corresponding to concentrations of 100%, 87%, 75%, 50%, and 40% sea water. Weight determinations of normal animals, antennary gland-plugged animals and gut-plugged animals were performed on the crabs in each concentration of sea water at various intervals throughout a twenty-four hour period. Osmotic and ionic determinations were also made at the end of this time.

From the evidence obtained, it was found that normal animals gain weight to a slight extent in dilute salinities. Furthermore, there is a trend for the increase in weight to be greater as the salinity is lowered. Antennary gland-plugged animals gain more weight than normal animals kept in the same dilution of sea water for the same length of time. Gut-plugged animals gain more weight than normal animals in the same concentration of sea water but this increase in weight is less than that for antennary gland-plugged animals.

Cancer borealis shows slight osmoregulatory powers in 100%, 87%, 75%, 50%, and 40% sea water. It maintains an hypotonic internal environment with respect to the external medium in 100% and 87% sea water while a hypotonic or isotonic internal environment was observed in 50% and 40% sea water.

Regulation of the ions sodium, potassium, calcium, magnesium, and chloride also exists in <u>Cancer borealis</u> in the various dilutions of sea water studied. Active absorption by the gills of some of these ions and selective excretion by the antennary glands of the animals seem to be the mechanisms involved in this phenomenon.

These results indicate that there are at least five physiological mechanisms involved in the osmotic and ionic regulation of Cancer borealis. These are: the relative impermeability of this animal to water; increased water excretion by the antennary gland to rid the animals of excess water as the external medium is lowered; the action of the gut in eliminating the animal of excess water as the external environment becomes more dilute; active absorption of salts, probably across the gill surface; and the adaptation

of the tissues of <u>Cancer</u> to changes in body fluids without any observable injury.

The impairment or breakdown of some of these mechanisms in low dilutions of sea water which causes the death of this animal is also discussed.

Microfilm \$2.00; Xerox \$4.60. 87 pages.

THE SYRPHID FLIES OF SOUTHEASTERN UNITED STATES (DIPTERA: SYRPHIDAE) (VOLUMES I AND II)

(L. C. Card No. Mic 58-7156)

Howard Vincent Weems, Jr., Ph.D. The Ohio State University, 1953

The primary object of the study has been to compile in one volume general and specific information concerning the syrphid flies of the southeastern United States, an area encompassing Florida, Georgia, South Carolina, North Carolina, Tennessee, Alabama, Mississippi, and Louisiana. Since Dr. S. W. Williston published his Synopsis of North American Syrphidae in 1886, no comprehensive publication treating the Syrphidae of North America, or any area within this continent larger than a single state, has appeared. Less than 350 species of Syrphidae from North America were known in 1886; today almost this many species are known to exist in the Southeastern United States alone. In order to identify a general collection of syrphids, one must consult numerous small publications, some of which are now out of print and often most difficult to locate. Furthermore, numerous changes have been made during the past 65 years in generic groupings and in specific names, further confusing anyone who attempts a study of this family of flies. In some genera many new species have been described without keys for separating the species in those genera. It was therefore considered worthwhile to attempt to provide a means by which students other than specialists in the group may identify Syrphidae of the southeastern United States, and to provide a fairly complete bibliography to the publications dealing wholly or in part with Syrphidae which are pertinent to this special study. A concerted effort has been made to ascertain the distribution of species within the southeastern states, based on collections made to date, insufficient as they are for drawing any final conclusions. A list of 24 collections examined in this study is given, and a check list of the species known from the southeastern states and adjacent states is also given. The check list includes data on species from adjacent states-Virginia, West Virginia, Kentucky, Missouri, Arkansas, and Texas-because species recorded from these states, but not yet known from the area studied, are considered to be potential inhabitants of this area. A complete list of the species known from Texas is not included, since only the small part of Louisiana east of the Mississippi River was included in the study area, and it was felt that the portion of Louisiana west of the Mississippi could be considered as a border state.

While this study is essentially a taxonomic and faunistic

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one, entailing an illustrated key to the genera, keys to species within the genera, descriptions of genera and species, and numerous ecological notes have been included. Data are given on host plants visited by syrphid flies; in some instances seasonal occurrence and relative abundance of species are given, and an effort has been made to shed some light on the economic effect of the Syrphidae, both beneficial and detrimental. A thorough survey of the pertinent literature was made in order to provide in condensed form interesting information concerning the Syrphidae and to correct several popular misconceptions concerning some of them.

Where the type locality and disposition of the holotype are known for a species, these are indicated under the description of that species. Two text figures, a typical syrphid wing and a lateral view of a typical syrphid thorax, are included, in addition to 136 figures drawn with the aid of camera lucida and 100 photographs of Syrphidae. A

complete table of the hymenopterous parasites of Syrphidae in North America is given, together with the species of syrphids which they parasitize. A glossary of technical terms employed in taxonomic studies of Syrphidae is included for the benefit of the uninitiated; there is also a discussion of the characteristics of the family Syrphidae and the characters used in their classification. Eight new species are described.

It is the writer's hope that this study will stimulate an interest in the Syrphidae which will result in the discovery of additional state records and new species. Many species remain to be discovered, for large areas, almost whole states, have remained virtually untouched by competent collectors. Microfilm \$8.05; Xerox \$28.00. 636 pages.

Abstract published by special arrangement with The Ohio State University.

MONOGRAPH

PSYCHOLOGY, GENERAL

MIND IN HYPERSPACE

(L. C. Card No. Mic 59-849)

Wilson Miles Van Dusen, Ph.D. University of Ottawa, 1952

Perhaps the most fundamental problem in science is the question of the nature of mind itself which makes all of science possible. All previous attempts to solve this problem have set forth four basic types of relationship of mind to the physical world. This work rests on the hypothesis that mind exists in real five, six and seven space. The properties of mind are the natural properties of events in those spaces.

To demonstrate this the first step was to show mind cannot exist in four dimensional space-time or in lower spaces. It is shown that existing four space and the physical are identical. Mind is shown to be unlike the physical in its experienced quality, its time spread, its lack of particularization in abstract ideas, and in secondary qualities. Lastly the experimental findings in parapsychology are cited to show the existence of a mental phenomenon which transcends space-time. All this makes it unlikely that mind exists within four space.

To explore higher spaces the realms of mathematics which could define their properties are examined. Geometry, topology, mathematical logic and group theory are studied. Topology and mathematical logic are found to offer the most useful approaches. For simplicity Euclidean space was used.

These describe the first three spaces of a line, plane and a solid. The four space they describe is shown to have the properties of Euclidean space-time. The fifth dimension they would describe as an entity which is a continuum of events. This was termed alpha mind which comprises events with dates past (memory), present (sense consciousness), and future (precognition). The formulas describe

six space so that it appears to comprise a dynamic field of abstract ideas and tendencies which is called beta mind. Seven space is described as a region which appears to contain self-reflection on ideas and actions which is called gamma mind.

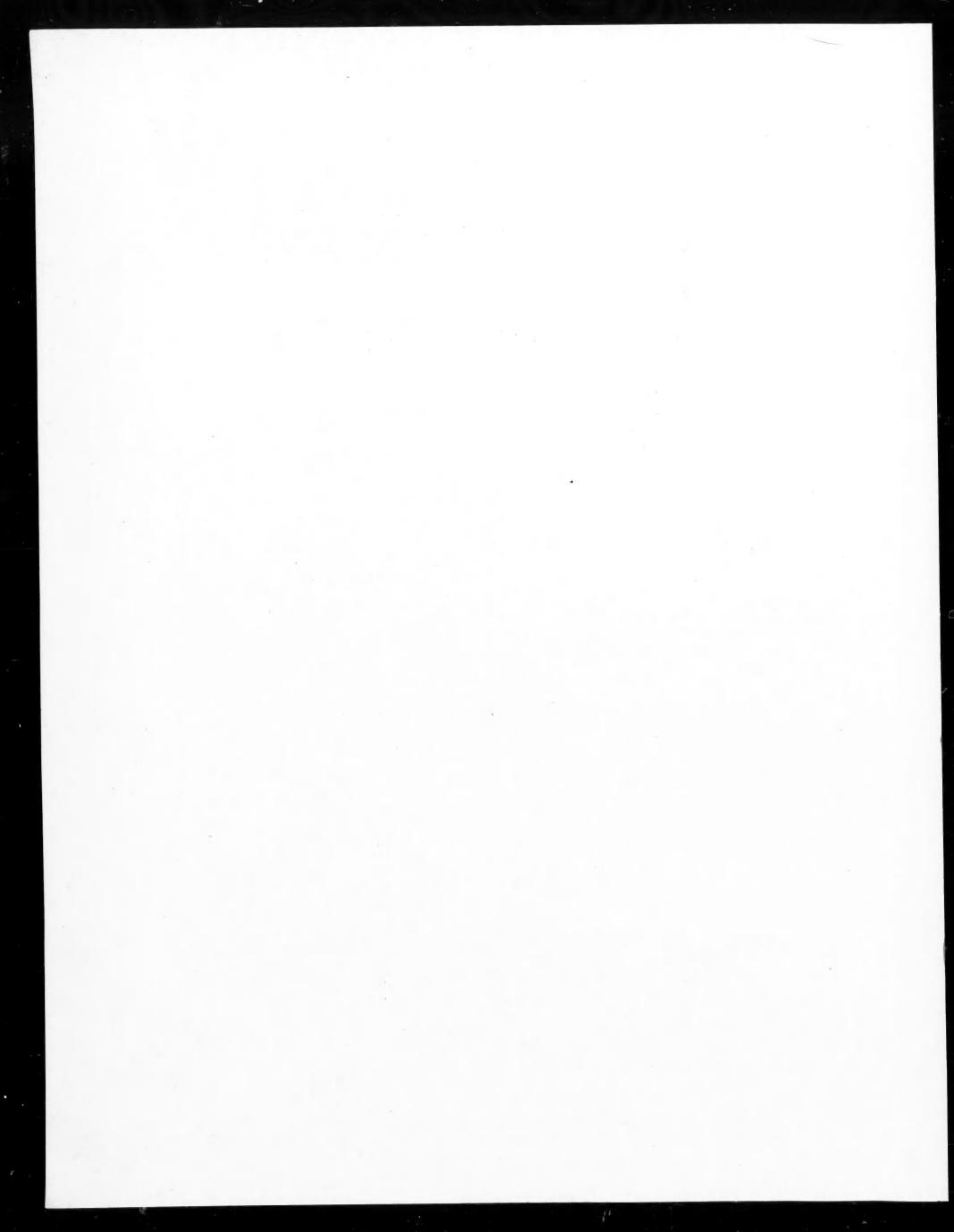
Since these spaces appear to describe mind as in three separate spaces it was necessary to see if dimension theory could account for the dynamic unity of mind. Out of the definitions of space five principles are described, two concerned with intralevel relations and three with interlevel relations. One intralevel principle would appear to account for the distinction of consciousness-unconsciousness. One interlevel principle relates all levels from seven to four space, from gamma mind to the physical brain. The principle concerned with higher to lower level relations would appear to describe creativity whereas the lower to higher level principle appears to describe learning.

After this development several collateral problems could be elucidated: the determinants of the contents of any level, the problem of level of functioning, and the determinants of the line of awareness. The latter (consciousness in a broad sense) was found to be fixed both by will and the time date of space-time. The lower end of this line is the brain itself. The theory is found to give an exact description of the mind-body relationship which accords with the data of neurophysiology. The theory gives a natural explanation for extra-sensory perception.

If the theory is true there are a number of important implications. It implies that levels or genera of all existence can be accounted for as interrelated levels of space. It implies that mind exists in the levels of space just above physical space-time. The theory implies mind is immortal and could be the basis of a science of the immaterial.

Although the theory is an adequate explanation of much of mental life, because extension and testing is necessary, it was concluded the theory may neither be fully accepted nor rejected at this time.

Microfilm \$3.15; Xerox \$10.80. 242 pages.



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